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FELIX MARTI-IBAÑEZ, M.D., Editor-in-Chief
Professor and Director of the Department of the History of Medicine,
New York Medical College, Flower and Fifth Avenue Hospitals, New York, N. Y.

VOL. 171 NO. 9 *WHOLE NUMBER 2907* *SEPTEMBER 1958*

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MD MONOGRAPHS ON MEDICAL HISTORY NO. 2

A History of Ophthalmology

by GEORGE E. ARRINGTON, JR., M.D.
Associate in Ophthalmology
Medical College of Virginia, Richmond, Virginia

Foreword by FELIX MARTI-IBAÑEZ, M.D.

A History of Ophthalmology presents a study of the development of the "ophthalmological mind" throughout the history of civilization. The book attempts to guide the ophthalmologist to the sources of concepts that regulate his daily clinical functioning. He is introduced to the great thinkers who established, through both reasoning and experimentation, the basic ideas of visual function and dysfunction on which the science of ophthalmology is founded. Ophthalmology is carefully related to medicine generally in this work, and their roles of interdependence and interaction are shown. 192 pp., clothbound, price $4.00.

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SYMPOSIUM ON AUTOMOBILE ACCIDENTS

GUEST EDITOR—JACOB KULOWSKI, M.D.

Medicine: A New Catalyst of Medical, Legal, and Engineering Aspects of Motorist Injuries and Safety

*Jacob Kulowski, M.D.**

ST. JOSEPH, MO.

The epidemic number and variegated nature of motorist injuries and deaths are tending to pull all types of persons, groups, and disciplines together in a common effort to reduce this toll. Since the most significant results of motor vehicle accidents are personal injuries to people, medicine stands in the vanguard of a gradually awakening engineering and legal opinion with respect to this sobering perspective. Such a triprofessional approach, properly channeled and coordinated, could minimize redundancies and duplications and perhaps achieve some sort of synthesis. This idea becomes increasingly more attractive in the absence of a universal theory of accident and injury causation. Therefore, clinicians, engineers, and lawyers must somehow blend their respective guardianships of the health, safety, and recovery from injury with respect to their individual clients, the community, and the state.

How is this to be accomplished? First, by recognizing and defining the chief targets of attack that are specialized and within the respective professional domains. Second, by a sustained exploration and development of these areas. Third, by translating these results into actions and deeds at the levels that will yield the most good for the greatest number. The chief efforts that must be currently accelerated and validated include, among others, accident prevention, reduction of injuries under crash and upset conditions, and improved medicolegal considerations.

* Author of *Crash Injuries: The Integrated Medical Aspects of Automobile Injuries and Deaths*, Springfield, Ill., Charles C Thomas. In press.

ACCIDENT PREVENTION

The germ of a universal theory of accident prevention (and reduction of injuries) may derive from biomechanical concepts, i.e., human and inanimate factors governing the entire history of motoring. Since primary safety is dependent on driver proficiency, safety performance of the vehicle, and the highway facility (including other drivers, vehicles in the vicinity, and abutting structures and lands), accidents are presumed to be due to either human or mechanical failures or near failures. The most unpredictable variable is the human factor, which makes up the more or less closed but complicated man-machine system. The simplest approach to improvement is the physical fitness of drivers.

The effectiveness of this principle as a deterrent to accidents awaits validation by reliable data on connections between physical (and other) deficiencies and greater-than-average number of accidents. However, every physician knows of situations wherein physical deficiencies played an important part in causing motorist accidents. Moreover, this is the area where the physician, in conjunction with maintenance of driver (and passenger) fitness, can render yeoman services where nobody else can. Once the idea takes hold—as it must inevitably—the field responsibilities will filter down to the county medical society levels. These societies should begin their preparations now.

Since safety performance of modern automobiles has reached a high level, the area remaining for engineers in this regard is the so-called human engineering point of view, i.e., the art of blending machine to human capabilities in such a way as to make accidents from that angle almost impossible. This is not the same as foolproofing for the foolhardy, but it could help the conscientious motorists. A tremendous amount of investigative effort has gone into this phase of the problem, most notably by Ross McFarland, his associates, and others. The chief physical obstacle to ultimate achievement along these lines is, again, human variability.

It may be that developmental lags are due to improper or inadequate laws. The lawyers are best fitted to study this aspect of the problem—compulsions with regard to human and inhuman requisites. It may also be true that the automotive industry is far in advance of these legal phases. The latter possibility has been all but forgotten in the rash of criticism of automotive safety engineering.

REDUCTION OF INJURIES
(CRASH IMPACT ENGINEERING POINT OF VIEW)

When primary safety fails, a set of abnormal interactions between riders and automotive environment are initiated, which result in property damage and, not infrequently, injury and death of occupants. The series of events on the outside should be the concern of engineers and lawyers everywhere. Since the crash forces, here, are dependent for magnitude on speed at impact, type of vehicle, object impacted, and the accident configuration (principal impacts: forward, angular, rear end, roll-over, tumbling, and noncollision types), the problems confronting these groups are admittedly complex. Since speed is the principal forerunner of death on the highway, both engineers and lawyers could work out reasonable top speed rules and regulations, at least state-wide in scope or, better still, on the national level.

"The accident within an accident" or what occurs on the inside is even more complicated. However, this much is certain: shorter decelerative distances and longer acting forces (pressures) tend to result in severe injuries and deaths. Summarized, forces operating on riders are applied (impulsive and/or crushing) and inertial, i.e., due to more subtle velocity differentials between parts of the body (externally and internally). Forcible ejection is a special case (double jeopardy when internal impacts occur before ejection or when other vehicles run over the ejected person), which sometimes does not result in injury at all, but which has been calculated to double the chances of mortal injury (Cornell crash injury research).

Two resultant extremes require further mention, i.e., in the equation between rider tolerances and magnitude of forces involved in crashes: (1) the fact that some persons escape injury often fatal to others in the same accident; (2) the lowered resistance or physical condition of riders, which predisposes them to injury under conditions ordinarily less injurious to normal people (so-called pathological injuries). The first is a little understood phenomenon, which Hugh DeHaven has suggested is due to some abnormal decelerative instant, but in any case it also indicates that modern automotive engineering and design are not always at fault under all conditions to all exposed persons.

Human predisposition to injury due to physical deficiencies has not been investigated enough in regard to motor vehicle crashes. My clinical experiences have been limited to arthritis, congenital anomalies, osteoporosis (spinal), and stiffness of such major joints as the knees and hips. Bone tumors that weaken the bone with possible subsequent fracture during accidents have been extremely rare in my experience.

The factor of substandard physical condition and crash injuries is of extreme significance for epidemiologists and public health workers who are interested in the problem. My experience with residual disabilities of the skeletal motor system from motor vehicle accidents indicates that the health of the motoring population who become involved in accidents and injuries is something less than perfect. This, of course, is another argument for driver medical screening. Just as crucial are the implications with respect to automotive safety engineering design (crash-proofing). Now it becomes increasingly clear that ever-greater limits of factors of safety are needed to offset accessory conditions that may predispose many of the motoring population to accidents and injuries.

FIRST AID

Since the vast majority of motorist casualties survive the initial crash forces, first aid—a paraclinical domain—properly applied, could be a potent factor in reducing further injury at the scene of accident, during transport to the hospital, on admission to the hospital, and even during transport to the hospital bed or during other intramural movements for diagnostic or therapeutic purposes, afterward. First aid is motivated by humanitarian principles and is usually executed by laymen. Why, then, is first aid so notably absent in crash victims as they appear in the admission departments of hospitals? Two reasons occur to me: (1) the first aid measures usually taught are often too complicated for lay capabilities, and (2) the layman fears

possible future legal reprisal for alleged damages accruing from first aid manipulations. Clarification of the latter situation might also improve ambulance services in regard to first aid. Engineers are invited to help simplify splinting methods for fractures of the extremities and bring this important measure within the capabilities of the average bystander.

The engineering and legal considerations of emergency care, definitive diagnosis, and treatment are not within the scope of this brief outline.

POSTCLINICAL REHABILITATION

Naturally, medicolegal considerations highlight the role of lawyers with respect to establishment of liability and recovery for personal injuries received. Legal preoccupation with residual disabilities, however, is having profound influences on the over-all medical and engineering picture and thinking. In fact, the well-informed probings of cross-examiners have focused attention on individual cases and attendant individual events constituting accidents. The implications of this attitude and method are several-fold.

First, carefully kept records showing possible connections between physical (and other) deficiencies and liability for accidents would validate or refute the premise that physical fitness of drivers should be a requisite for driver privileges.

Second, legal concentration on individual cases suggests that perhaps the "trees" of crash-impact engineering are sometimes lost in the "forest" of statistical data. As an illustration of this point may be noted the incidence of fractures of the long bones in motorist casualties. The femur is the largest bone in the body and frequently its fractures are the most disabling. Yet, despite its vulnerable position in the seated figure, especially in the front of the car, it is not the ranking fracture in crashes (in survivors at least) in any series of cases that isolate these injuries from other injuries about the knee joint and the hip joint. However, isolated injuries of the femur on the background of juxtafemoral injuries yield a different viewpoint on the relationships between the seated rider up front and his impact areas, i.e., the dashboard, for the most part. From this angle, the injury potential of the dashboard (and related structural elements) is impugned with greater forcefulness. Also, it is clear that the reduction of fractures of the extremities probably involves femoral fractures more than any others. Thus, the almost infinite variety of femoral and parafemoral fractures become better related to pathogenetic factors of engineering significance.

Third, the so-called whiplash injuries of the neck (and low back, or both) need further clarification. Undoubtedly, legal contests have stimulated more objective clinical and radiological investigations in order to clarify the diagnosis and differentiate grosser skeletal lesions from so-called "sprains." More gross skeletal lesions are being detected with specialized roentgenographic techniques. It is evident that the cross-examination of medical witnesses ought never to be minimized no matter what the status of the witness may be.

Fourth, the effects of improved differential diagnoses should not be lost on automotive engineers, especially since the investigations of Severy and Mathewson, Haynes, and others have thrown further light on both forward and rear end col-

lisions from the engineering point of view, particularly with regard to their complexity and dissociation between what happens in the external and internal automotive environments. These investigations, tied in with the epochal delineations of human tolerances to decelerative forces by Colonel Stapp, have opened the way to improved crash safety.

CONCLUDING OPINIONS

The medical, engineering, and legal aspects of motorist injuries and motorist safety are so closely related that it is becoming almost impossible to speak of one without penetrating one or both of the other fields. The next step involves translating the energies of these professional groups into wider channels for the greatest good. This requires building a safer edifice for the motoring population. Medicine can furnish the building blocks. Engineering must supply the mortar. From the legal profession can come the social architectural design. Whence comes the mandate? The Fifth Commandment, of course. The building permit will have to come from an enlightened public.

SYMPOSIUM ON MEDICINE AND WRITING

The Symposium on Medicine and Writing that appeared in the November 1956 issue of INTERNATIONAL RECORD OF MEDICINE has been published as a Monograph. The articles included in this Monograph are: "The Editing of a Modern Medical Textbook" by Russell L. Cecil; "Plain Talk and Clear Writing" by Morris Fishbein; "The Principles of Bibliographic Citation" by John F. Fulton; "The Art of Communication" by Joseph Garland; "On Writing a History of Medicine" by Douglas Guthrie; and "Minerva and Aesculapius: The Physician as Writer" by Félix Martí-Ibáñez

This 72 page Monograph is sold for $3.00. As the fourth in the series of MD International Symposia, this book is the companion piece of *Medical Writing*, which was published in May 1956

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Traffic Trauma and the Physician

Vernon C. Turner, M.D.

EVANSTON, ILL.

Traffic accidents account for an enormous number of injuries and fatalities each year. During World War II the heaviest loss of men occurred in the "Battle of the Bulge." In a period of 10 days, approximately 10,000 men were lost. Last year in this country we lost more than 40,000 persons in traffic accidents, and 30 times that many were seriously and permanently injured.

Automobile accidents have become the second in the list of causes of death, ranking only below heart disease, and accidents are a more important cause of crippling than poliomyelitis, arthritis, or any other medical condition.

It is true that we are making progress against this problem of automobile accidents. There are many nonmedical and a few medical groups that have long been at work on it. A number of universities, notably Cornell University and the University of California, have crash injury study programs. The armed services are studying various phases of the problem. The Navy has a particularly outstanding study of deceleration and its effects on personnel. The Traffic Institute at Northwestern University has trained police from many of our own cities and states, as well as from some cities abroad. In addition, they have special courses for many lay groups in problems of traffic control. Such courses have been organized for newspaper men, for judges, for justices of the peace, and for physicians. The President of the United States has appointed a committee of citizens from each state to make known the action program on traffic safety, and the President's highway safety conferences bring many of the community and industrial leaders together for this same purpose. In Illinois there is a Governor's Committee on Traffic Safety and a citizen's Traffic Study Commission with salaried, full-time personnel. The National Safety Council occupies a full floor in one of the large office buildings in Chicago, and approximately 400 employees devote much of their time to traffic accident studies. The American Medical Association, the American College of Surgeons, and the American Academy of Orthopaedic Surgeons have committees at the national level, which have done excellent work. The American College of Surgeons' committee has been particularly interested in working with manufacturers of automobiles to increase safety features, and it has been especially successful during the past two years, largely through the cooperation of two of the large companies. So we can say that some progress is being made.

The accident rate has steadily decreased, but the number of fatalities has remained almost constant at just under 40,000 persons in the past several years. The exposure factor for our population has increased enormously. There are more people, more motor vehicles, and a larger proportion of the population driving these vehicles than ever before. There were 27,600,000 additional motor cars added to the highways of the country in the years 1945 to 1954. During that same 10 year period we constructed 53,000 lane miles of highways. If the 27,600,000 motor vehicles were

placed bumper to bumper they would extend the distance of 88,900 miles—more than one and a half times the length of new road construction.

In past decades, physicians have seen to it that swamps were drained, that contaminated water and food sources were cleaned up, that masses of children were vaccinated. Now we must interest ourselves in the prevention of this "social disease."

Traffic accidents can be considered a public health problem. In the past we have been interested in the end product of the accident—that is, the care of the injured person. We must still seek ways of improving medical care of the injured. More will be spoken of this later. For the moment let us consider the problem of prophylaxis of automotive injury as it involves the medical profession.

Just what is the role of the medical profession in the prevention of traffic accidents? What is the plain duty of John Doe, M.D.?

The Chicago Regional Committee of Trauma of the American College of Surgeons has a subcommittee that has spent a good deal of time during the past year attempting to figure out the answer to these questions. We have come to the conclusion that there is no simple and easy answer to the problem of accident prevention.

One might consider the role of the physician first as that of an individual. As a citizen and as a family man he is responsible for reasonably safe and law-abiding practices in the use of his car, both by himself and by members of his family. As a physician his position in the community is such that whatever safety features he insists on for his car will have an effect as an example for others in the community. The physician can lead in the educational campaign to demand safety in cars. He knows that if only a small part of the money that goes into chrome trim, wider and higher tail fins, and such falderal were diverted into safety features, there would be fewer fatalities and seriously injured people. The number of accidents probably would not be affected, but their effects on the occupants of the car involved in an accident would be ameliorated.

Those practical experts in traffic safety, the drivers in stock car races, have developed techniques that permit them to walk away from auto crashes, which are part of the thrill of the sport as far as the spectator is concerned. Crashes could be said to be a professional hazard to them. They have learned to wear the car like a suit of battle armor. The cars crash, but the drivers do not get hurt. This is accomplished by making only a few changes in the stock cars: the use of safety belts and crash helmets, the use of crash padding and of roll-over bars to strengthen the top, and the practice of wiring the doors shut to give added rigidity to the body, as well as to keep the driver from falling out.

The use of properly tested and installed safety belts, the elimination of projecting instruments on the instrument panel, the elimination of interior car surfaces having a curve with a diameter of less than two inches, the use of two inch thick plastic foam crash padding, the use of deep dish design steering wheels, of safety door catches that do not open on minor shock or torsion, the strengthening of the roof structure so that it will be depressed no more than four inches when the car is dropped on its top from a distance of 15 feet (this equals the speed of about 20 miles/hour) are all reasonable safety factors that would be demanded by an informed public.

The so-called "crash pad" on one of the most popular medium-priced 1956 cars was only about ¼ inch thick. The cigar lighter in this car the year before was directly in the center of the dashboard, just where a child's head would hit if he were seated on the front seat between father and mother, in a child's usual position. It has been estimated that all the aforementioned safety features, if built in at the factory, would cost not more than 40 or 50 dollars. So much could be done by planning at the drawing board stage at no added cost at all.

Mechanical failure has been almost eliminated as a cause of auto accidents, but with the new superhighway construction, engineered so that speeds of 100 miles an hour are feasible, and with new motor power making such speeds possible, there could be a resurgence of mechanical failure as a cause of accidents. Tires are particularly vulnerable. Ordinary present-day tires are not designed for continuous speeds greater than 70 or 75 miles an hour in hot weather.

Human nature being what it is, a major factor in automobile accident prevention will probably always be an efficient and incorruptible police force. As with automobile safety features, this is something that an enlightened public must demand. A police force can be only as good as the public demands. If the police are venal, if the citizen of social and political prominence receives special consideration, in other words, if "law is made only for the other fellow," the situation becomes hopeless. But also, the control of traffic problems demands special training and special techniques on the part of the police. Indiscriminate and routine enforcement of all laws has little effect on traffic safety. There are just not enough police to do that, nor will there ever be. But if analysis shows, for instance, that several accidents at the corner of First and A streets have a common cause and occur during certain hours, then the posting of a policeman at that corner during those hours to watch for and prevent that particular cause from arising will have an effect on the prevention of such accidents.

For the first few years of its use, Edens Highway, one of the limited-access, divided eight lane approaches to Chicago, earned the name "death trap"—in spite of advanced and modern engineering. The accident record remained high until adequate police patrol was provided. In the same way, the presence of Wisconsin State Highway Patrol cars stationed where they can see and be seen for a mile or so either way on Wisconsin superhighways has paid off well in the accident-prevention sense.

Another tool that the police should have is the chemical test for the alcohol content of blood. If this test is not available, it becomes very difficult to obtain a conviction for drunken driving. So often in dealing with accident victims in the emergency rooms of our hospitals, we simply say nothing at all about the state of sobriety. We have no definite proof, and we do not want to make a damaging statement about someone unless we are almost absolutely certain of the truth of that statement—nor should we. However, the determination of the alcohol level by the police for the purpose of obtaining the facts is, it seems to me, a very different situation and one that is entirely justified. It is time that we assumed an adult attitude toward the drunken driver who becomes involved in serious accidents.

In addition to an adequate, honest, and effective police force, there must also be a good traffic court system, so that justice, which is reasonably prompt and sure,

becomes an accepted thing. The justice-of-the-peace system that we have in my state and in many others in the country is wholly inadequate—it is a pioneer system, and we have far outgrown that stage of development. The establishment of special traffic courts affords an opportunity to judges and prosecutors to become familiar with the special problems incident to traffic violations. Separate courts, separate traffic court days, or separate traffic court sessions are increasing throughout the nation. The "fixing" of tickets for certain groups of violators, a serious abuse of the judicial process, can be eliminated through the understanding of judges and prosecutors of their essential function in maintenance of safe driving practices, through the use of regular audits of tickets and the use of ticket systems that permit general knowledge of the ultimate disposition of any case for which a ticket was written, and through demand by the public (usually interested groups such as a traffic safety council or commission) for fair and impartial administration of justice. The failure of many violators to appear in court in response to tickets and summonses can be eliminated by the prompt issuance of warrants and quick service on the neglectful.

The most important factor in motor vehicle accident prevention is not the car, nor the road, nor the police, but the man behind the wheel. What can be done to improve the general level of driving? This can be influenced in two ways: by improving the quality of driver education and by the prevention of driving by those unfit or unwilling to drive safely.

There is pretty definite proof that a good driver education program in the high schools will effect a considerable improvement in driving patterns. The city of Cleveland compared the subsequent driving record of a thousand young people who had been trained in driver-training courses in their schools with a thousand controls and found that there were approximately 50 per cent less violations and fewer accidents in the trained than in the nontrained group.

Some insurance companies will give up to 15 per cent reduction in premiums for those who have passed a recognized driver-training course. The adequacy of such courses varies. The difficulties in establishing good courses are two: first, the financing of such courses and, second, the obtaining of good teachers.

Fourteen states now provide state aid for driver education courses in the high schools. Money for this purpose is obtained from one of three sources: the drivers' license fee, a proportion of money (usually 1 part in 10) from traffic fines, and the automobile registration fee. The new Illinois motor vehicle law has been based on the Uniform Motor Vehicle Code. It provides for an increase in the drivers' license fee from one to three dollars for three years; two dollars will be prorated to the high school districts of the state at the rate of approximately $30 per junior student per year. This is enough to provide some 30 hours of classroom work, six hours of driving, and 18 hours of in-car observation per pupil per year—a minimum driver education program.

The commercial schools of driver training are of spotty quality. Some teach just enough to "pass the test."

The second method of improving driver performance lies in control of licensure. If those whose records prove that they will not drive carefully, or cannot, are re-

fused permission to drive, only the better drivers are left on the roads. This is probably only a small factor in improving general driving performance but is one that nevertheless needs to be followed up. It is in this area of the development of adequate physical and mental standards for driver licensure that the physician must work, not as an individual but as a member of an important profession, and on a state level, if he is to accomplish anything. For it is at the state level of government that driver license control exists. The medical profession in several states has cooperated with government to set up such standards—notably in Oregon, California, and Massachusetts. New York has studied the problem through the auspices of the Bellevue-Columbia medical center, and in Illinois discussions are under way. We have found in Illinois that the secretary of state's office and the state health officer would welcome sharing responsibility in developing standards and in enforcing those standards. This is a job that the official organization of medicine within the state (the state medical society) alone is qualified to undertake.

Finally, we come to the matter of improvement in emergency care of the injured. Essentially, there are two routes by which this is accomplished. One method has to do with the training of medical students in the process of developing medical skills to work with us in the hospitals. This involves the residency training programs and the standards set up by the specialty boards. Fortunately, these seem to be progressing very well indeed. We are getting well-trained young men in all the surgical specialties—general surgery, orthopedic surgery, neurosurgery, ophthalmology, urology—probably in greater numbers and with better training than ever before.

The picture is not so bright with regard to the quality of training of our medical students in the treatment of trauma. There are undoubtedly a number of causes for this, and it is difficult to single out one without giving it undue weight. The competition for the time of the medical student is keen, and each specialty is accused of trying to make a specialist of him. But there can be no doubt of the need for all medical students to be grounded at least in the fundamentals of the treatment of the injured. This cannot be done unless the curriculum committees of our schools will allot sufficient time for teaching to those specialties that are primarily interested in the injured patient.

The second way to improve emergency care of the injured is to ensure that our emergency room staffs are organized to take the greatest advantage of this training and skill. There are two parts to this problem. One is to see that the nonassigned patient is assigned to the individuals best able to handle his major problem. The patient whose chief injury is to the eye should see an ophthalmologist; the patient whose chief injury is to the brain should see the neurologist. This is not in any sense to by-pass the family physician. We are here talking only about those patients who have no preference for a physician. In fact, let it be said specifically that the family physician is best able to determine what disposition should be made of the patient. Nevertheless, the departmentalization of the staff into fields of major interests and the assignment of patients accordingly works incontrovertibly toward giving the best care to the injured patient, and that is, after all, the end that we as physicians most desire. The second part of the problem is the organization of the

personnel of our hospitals in such a way that we can efficiently handle a reasonable number of injured persons. In this era of high speeds and crowded traffic, mass injuries must be expected and planned for. This calls for organizational effort at the level of the hospital administrator and of the city public health officer.

These, then, are ways in which the physician can influence traffic injuries:

First, in his role as a citizen he can increase his own and the public's knowledge and demand for safer cars, for an adequate and effective police force and traffic court system, for driver education of the new driver as well as the repeating violator.

Second, as a member of the state medical society he can join in developing proper physical and mental standards for driver licensure.

Finally, he can add his influence to developing a better organization of the hospital emergency service, and to the adequate training of younger men in the treatment of trauma.

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Published quarterly by:

MD PUBLICATIONS, INC., 30 East 60th Street, New York 22, N. Y.

Subscription rates, including a cumulative cross reference index: 1 year, $11.00; 3 years, $28.00.

The Legal Aspects of Chemical Tests to Determine Alcoholic Influence*

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National Safety Council records indicate that about one of every five drivers involved in fatal motor vehicle collisions had been drinking intoxicating liquor and that one of four adult pedestrians killed by motor vehicles had been drinking.[1] Reports received from cities and states, from which Council records are compiled, show that drinking drivers and pedestrians constitute one of the major problems confronting law enforcement agencies and the courts.

It is true that all traffic collisions cannot be traced to intoxicated drivers. There are many other causes, but a large percentage of the serious highway collisions are attributable to the detrimental influence of alcohol on the person behind the steering wheel. Almost every community has suffered extensively because of the dangerous role the unwise use of alcohol plays in street and highway traffic.

Successful prosecution and conviction of motorists who drive while under the influence of intoxicating liquor are probably the most effective deterrents to the problem. How to determine whether a driver was "under the influence of intoxicating liquor," as distinguished from the motorist who had only "two beers," is the everyday quandary of the traffic officer, prosecutor, judge, and jury.

Modern scientific aids have been developed to assist them. No longer must they rely solely on evidence of physical or clinical symptoms. Chemical methods have been developed for determining the alcohol concentration in the blood by an analysis of bodily substances, i.e., blood, urine, or breath. Such analyses, when properly conducted, will determine accurately whether and the extent to which a suspect is "under the influence of intoxicating liquor." Evidence of the result of such chemical analyses may be used to supplement and corroborate the clinical symptom evidence, no matter how slight, obtained through the senses of sight, hearing, and smell.

Since the first case involving a chemical test to determine alcoholic influence was decided by the Supreme Court of Arizona in 1937,[2] the case law and statutory law concerning this subject have developed rapidly, comparatively speaking. The law as a jealous guardian historically has been opposed to rapid adoption of new ideas or change without long and extended consideration and deliberation. However, in the field of modern sciences, she has been as eager as any of the other arts to recognize new scientific methods of attaining knowledge and the truth as quickly as they are developed and become established as to their utility and reliability. This has been true especially in the field of chemical tests to determine alcoholic influence.

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* This article deals with but a few of the legal phases of chemical test evidence. For a complete list of court decisions and a detailed and comprehensive discussion of all constitutional, statutory, and case law involved in chemical tests to determine alcoholic influence, see *Chemical Tests and the Law* by Robert L. Donigan, LL.B. (Evanston, Ill., Traffic Institute, Northwestern University, 1957).

In the short time of just the past 21 years, there has been established in the United States a substantial foundation of case law and statutory law on which to base the use of chemical tests to determine alcoholic influence by every existing law enforcement agency, not only to combat the hazard of the drinking driver but as an aid in other types of criminal cases as well. Recent reports indicate that approximately 900 police agencies in the 48 states have established chemical testing programs in their communities.[3] As of Sept. 1, 1958, there were 250 published opinions of courts in cases involving chemical tests to determine alcoholic influence. This represents the courts in 38 states and the federal jurisdiction. The case law thus established by those court decisions is in addition to the statutory law established by legislation in at least 28 states.*

CONSTITUTIONAL RIGHTS

Interest in chemical tests to determine alcoholic influence was considerably heightened in February, 1957, when the Supreme Court of the United States published its first opinion on the legality of such tests.[4] In a New Mexico case, it affirmed the conviction of motor vehicle homicide against a truck driver who, while driving under the influence of intoxicants, had collided with another vehicle and killed its three occupants.

The truck driver himself had been rendered unconscious from injuries incurred as a result of the collision. While the driver was still in a coma under treatment in the hospital, a physician at the request of a state policeman had extracted a small specimen of the driver's blood, which, on analysis, disclosed a high alcoholic content. This result was introduced in evidence at his subsequent trial on a charge of motor vehicle homicide, to show that he had been under the influence of intoxicants at the time the collision occurred. After his conviction the truck driver petitioned for a writ of habeas corpus claiming a violation of his privilege against self-incrimination and a denial of due process, the latter on the premise that the obtaining of the blood specimen constituted an act of offensive brutality. The Supreme Court of New Mexico, in refusing a writ, adhered to the majority rule that the privilege was applicable to testimonial compulsion only, not to the obtaining of physical evidence, and furthermore, that there was nothing so brutal and shocking about obtaining a specimen of blood from an unconscious person to bring the act within the orbit of the due process clause.

The Supreme Court of the United States in upholding the state court's disposition of the petition said:

> Basically the distinction rests on the fact that there is nothing "brutal" or "offensive" in the taking of a sample of blood when done, as in this case, under the protective eye of a physician. To be sure, the driver here was unconscious when the blood was taken, *but the absence of conscious consent, without more, does not necessarily render the taking a violation of a constitutional right;* and certainly the test as administered here would not be considered offensive by even the most delicate. Furthermore, due process is not measured by the yardstick of personal reaction or the

* Arizona, Arkansas, Colorado, Delaware, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin, Wyoming.

sphygmogram of the most sensitive person, but by that whole community sense of "decency and fairness" that has been woven by common experience into the fabric of acceptable conduct. It is on this bedrock that this Court has established the concept of due process. The blood test procedure has become routine in our everyday life. It is a ritual for those going into the military service as well as those applying for marriage licenses. Many colleges require such tests before permitting entrance and literally millions of us have voluntarily gone through the same, though a longer routine, in becoming blood donors. Likewise, we note that a majority of our States have either enacted statutes in some form authorizing tests of this nature or permit findings so obtained to be admitted in evidence. We therefore conclude that a blood test taken by a skilled technician is not such "conduct that shocks the conscience," . . . nor such a method of obtaining evidence that it offends a "sense of justice," . . .

The test upheld here is not attacked on the ground of any basic deficiency or of injudicious application, but admittedly is a scientifically accurate method of detecting alcoholic content in the blood, thus furnishing an exact measure upon which to base a decision as to intoxication. Modern community living requires modern scientific methods of crime detection lest the public go unprotected. The increasing slaughter on our highways, most of which should be avoidable, now reaches the astounding figures only heard of on the battlefield. The States, through safety measures, modern scientific methods, and strict enforcement of traffic laws, are using all reasonable means to make automobile driving less dangerous.

As against the right of an individual that his person be held inviolable, even against so slight an intrusion as is involved in applying a blood test of the kind to which millions of Americans submit as a matter of course nearly every day, must be set the interests of society in the scientific determination of intoxication, one of the great causes of the mortal hazards of the road. And the more so since the test likewise may establish innocence, thus affording protection against the treachery of judgment based on one or more of the senses. Furthermore, since our criminal law is to no small extent justified by the assumption of deterrence, the individual's right to immunity from such invasion of the body as is involved in a properly safeguarded blood test is far outweighed by the value of its deterrent effect due to public realization that the issue of driving while under the influence of alcohol can often by this method be taken out of the confusion of conflicting contentions.

For these reasons the judgment is affirmed. [My italics.]

Thus the Supreme Court of the United States followed the majority rule that there is no violation of a person's constitutional rights in a physician's extracting a specimen of blood from an unconscious person at the request of a police officer for the purpose of determining blood alcohol concentration.[5] While the court's opinion was based primarily on the principle that the facts in this case did not show any violation of the due process clause of the Fourteenth Amendment to the Federal Constitution, it does engender revived interest in the limited scope of the constitutional privilege against self-incrimination, which is little understood by laymen and far too many members of the legal profession itself.

The privilege against self-incrimination existed at common law and has been preserved in the Fifth Amendment to the Constitution of the United States, which provides that no person "shall be compelled in any criminal case to be a witness against himself." All the states, either by statutes or in their constitutions, have similarly preserved the privilege.

Eminent legal historians have traced the origin of the privilege against self-incrimination to the middle of the seventeenth century in England. It developed as a restriction on the cruel religious persecutions for heresy in the ecclesiastical courts and primarily for the purpose of stripping these courts of their increasing authority

so that they might be kept within their proper status—beneath the dignity and authority of the common law courts. Unlimited inquisitorial powers, permitting the administration of the oath ex officio and the compulsory examination of persons accused of heresy and of other offenses within the jurisdiction of the Church courts, seemed to endanger the authority of the courts of common law. In addition to this, there existed a general disapproval of the practice, not so much because an accused person was forced to testify against himself concerning the particular charge against him, but principally for the reason that such a practice permitted a general inquiry into a person's behavior and conduct, however unrelated they might be to the charge in question.

Not long after the abolition from the ecclesiastical courts of the practice of compelling persons suspected of heresy to endure extensive cross-examination under oath, the practice was abolished in the common law courts in criminal trials and later in civil proceedings and became settled into the bedrock of English common law.

The settlement of the American colonies took place at about the time in English history when opposition to the practice in both the ecclesiastical courts and later the common law courts was most pronounced. Apparently the very reasons that contributed to the change in the English common law concept of the rights of accused persons largely accounted for the recognition of the privilege in the colonies and for its incorporation in the Federal Constitution and in the constitutions of the various states.*

Accordingly, it has been the contention of legal historians and the majority of the courts that the primary purpose of this constitutional privilege was to protect against the practice of extracting from a person's lips an admission of his guilt by compulsion. Thus, in the federal courts and in most of the state courts this interpretation has persisted and the scope of the privilege has been limited to testimonial compulsion—what a person may be compelled to say against himself either through his own lips or through his penmanship. They have refused to extend the scope of the privilege against self-incrimination to the obtaining of physical evidence. They have held admissible evidence obtained by the physical examination of the body of the accused, such as peculiar marks or scars, venereal disease, dried blood on the skin and burnt powder on the hands, fingerprint evidence, and photographs of the accused. They have approved compelling a person to stand up in a courtroom or in a police line-up and to place his feet in footprints found at the scene of a crime for comparison. Likewise, our courts have held that the scope of the privilege against self-incrimination does not include obtaining without brutality an accused's bodily substances, such as blood, urine, or breath, for the purpose of chemical analyses to determine alcoholic influence.†

Although the applicability of the privilege against self-incrimination seems uppermost in interest whenever chemical tests to determine alcoholic influence are discussed by laymen or lawyers, there are many other legal aspects—of equal if not

* For a thorough discussion of the history of the privilege against self-incrimination see *Self-Incrimination—What Can an Accused Person Be Compelled To Do?* by Professor Fred E. Inbau, Springfield, Ill., Charles C Thomas, 1950.

† See *Chemical Tests and the Law*, pp. 104 *et seq.*

greater importance—to be considered in determining the admissibility of evidence involving such tests. It will be noted that in the earlier cases concerning the admissibility of chemical test evidence, the attention of our courts was being directed mainly to the possible constitutional issues involved. As careful research of the histories and principles of our protective guaranties has resolved these issues generally, and as the bench and bar have become better acquainted with the validity of chemical tests and their scientific principles, it will be observed that the courts have been concerned to a greater degree with the foundational requirements for the admission of such evidence. Some of these requirements fall into the following four categories: validity of chemical tests to establish amount of blood alcohol concentration, interpretation of results of chemical tests, reliability of test method to determine blood alcohol concentration, and evidence of proper techniques and methods of conducting chemical tests.

VALIDITY OF CHEMICAL TESTS TO ESTABLISH THE AMOUNT OF BLOOD ALCOHOL CONCENTRATION

The introduction in a court of law of scientific evidence in the nature of chemical analyses of substances of the human body and the results thereof presents no new legal questions. Too many persons, unfamiliar with the long-established and fundamental rules of evidence concerning the admissibility of scientific matter, have a mistaken impression that some sort of special permissive legislation is necessary before evidence concerning chemical tests to determine alcoholic influence can be admissible in our trial courts. This simply is not true. Over the decades our courts frequently have approved the admissibility of many types of scientific evidence without statutory sanction. Most types of scientific evidence are admissible without any specific legislation with respect thereto as long as the fundamental rules of evidence are observed in their presentation and introduction. This is particularly applicable to evidence relating to chemical tests to determine alcoholic influence.

Statutory sanction has its merits. One of these is the psychological benefit of engendering acceptance on the part of those who, through lack of information concerning the probative value of chemical test evidence, otherwise might be prejudiced and biased against its admissibility. Another favorable factor of statutory law sometimes is that it eliminates the necessity of producing expert testimony on elementary and fundamental matters relating to such tests. Regardless of such statutory provisions, however, the attorney seeking to introduce evidence of the result of a chemical test before a jury or uninitiated judge will be wise to provide the same type of expert testimony as he would in the absence of the statute. Until the scientific facts relating to chemical tests to determine alcoholic influence become a matter of common knowledge, this is still a task of courtroom education.

When it is sought to introduce evidence of chemical tests, their validity to establish the amount of blood alcohol concentration in an individual must be shown. This requires the testimony of a qualified expert to trace the movement of alcohol through the human body, to show its absorption after consumption, its distribution throughout the body, its elimination through oxidation and excretion, and its effect

on the nervous system. Such an expert witness should be able to explain on the witness stand consumption tolerance, constitutional tolerance, deterioration in an individual's performance due to alcohol, and the diagnosis of alcohol influence through physical examination for clinical symptoms. Such a witness further should be qualified to explain on a witness stand the scientific principles of chemical tests to establish the amount of blood alcohol concentration in an individual and their validity.

Numerous appellate courts have recognized the validity of chemical tests of body substances, including breath, to reveal impairment of driving ability resulting from alcoholic influence. In keeping pace with modern science, the courts realize that chemical tests to determine blood alcohol concentration are of definite probative value in showing to what degree a person's mental and physical faculties have been affected by the use of alcoholic beverages. Accordingly, they have demonstrated willingness to approve the admissibility of this type of scientific evidence when the tests have been conducted properly and an adequate foundation is laid for their introduction.

As the District Court of Appeal in California said in an early case:

> Opinions of qualified medical doctors as to whether an individual was intoxicated or not predicated upon the percentage of alcohol in the individual's blood, though not conclusive, are admissible when there is a proper preliminary showing that the blood tests upon which such opinions have been predicated have been properly conducted.[6]

The following statement of the Criminal Court of Appeals of Oklahoma in one of its opinions also is representative of modern judicial thinking in this area:

> . . . This court is of the opinion that we should favor the adoption of scientific methods for crime detection, where the demonstrated accuracy and reliability has become established and recognized. Justice is truth in action and any instrumentality, which aids justice in ascertainment of truth, should be embraced without delay . . . We believe . . . chemical tests by experts of body fluids as blood, urine, breath, spinal fluids, saliva, etc., under varying conditions have been approved as having gained that scientific recognition for infallibility as to be admissible in evidence. . . .[7]

Practically all of our courts that have had occasion to pass on the admissibility of chemical test evidence, either directly or by implication, have held that such scientific evidence is valid and admissible when the chemical tests have been properly conducted and the facts are presented in court according to the well-established rules of evidence. No court yet has reversed a case on the grounds that chemical tests are not valid for the purpose of determining alcoholic influence.

INTERPRETATION OF RESULTS OF CHEMICAL TESTS

Medical scientists through their thousands of extensive experiments in this area are generally agreed that: (1) Practically no person having less than 0.05 per cent blood alcohol concentration can be considered "under the influence of intoxicating liquor" with respect to impairment of driving ability, within the meaning of the statutes and as defined by appellate court decisions. (2) The driving ability of many

persons, but not all, is impaired when the blood alcohol concentration amounts to more than 0.05 but less than 0.15 per cent. (3) No person with a blood alcohol concentration amounting to 0.15 per cent or more remains unimpaired as far as driving ability is concerned, regardless of his or her resistance or tolerance to alcohol or previous experience in partaking of alcoholic beverages.

When the result of a chemical test of a person's blood, urine, or breath has been received in evidence in a court proceeding in order to show that person's state of sobriety at the time in issue, it is necessary to interpret the result and to correlate it with one of these three zones for the benefit of the judge and the jury. Otherwise, introduction of such evidence is of little value to the finders of facts not versed in this field. This means that a qualified expert must testify to the particular effects of stated quantities of blood alcohol on the nerve centers and the specific effect that the amount of alcohol estimated as a result of the chemical analysis to be in that particular person's blood has on the average person with respect to the degree of alcoholic influence.

While it is true that the statutes in many states establish presumptions in two of these three zones of blood alcohol concentration, rendering expert testimony in this particular area nonessential, yet as in the matter of validity of chemical tests generally, it is wise for the proponent of such evidence to provide the same type of expert interpretative testimony as he would if there were no statute. Courtroom education remains essential until all these scientific matters become a matter of common knowledge to the ordinary layman.

Our courts have been most receptive to expert testimony relating to the validity of these scientifically developed standards, even without any specific legislative sanction. Typical of the general attitude of our courts is the following expression from an opinion of the Oklahoma Criminal Court of Appeals:

> From the cases generally, it is apparent that, subject to compliance with conditions as to relevancy in point of time, tracing and identification of the specimen, accuracy of the analysis, and qualification of the witness as an expert in the field, there is rather general agreement that where the prosecution in a criminal case seeks to establish the intoxication of the accused, evidence as to the obtaining of a specimen of his body fluid at or near the time in question, evidence as to the alcoholic content of such specimen, as determined by scientific analysis, *and expert opinion testimony as to what the presence of the ascertained amount of alcohol in the blood, urine, or other body fluid of an individual indicates with respect to the matter of such individual's intoxication or sobriety*, is ordinarily admissible as relevant and competent evidence upon the issue of intoxication, at least where the accused voluntarily furnished the specimen for the test, or submitted without objection to its taking.[7] [My italics.]

The conclusion of our medical scientists that no person with a blood alcohol concentration amounting to 0.15 per cent or more remains unimpaired as far as driving ability is concerned should not be misunderstood. Even though most specialists in the field of chemical tests to determine alcoholic influence contend that every person with 0.15 per cent or more blood alcohol concentration is definitely under the influence of intoxicants and therefore not competent to operate a motor vehicle, this does not mean that the converse is true—that every person with less than 0.15 per cent blood alcohol concentration is not under the influence of intoxicants and therefore can be trusted in the operation of a vehicle. It is true that few experts on

the subject are willing to take the witness stand and express the opinion that a particular person was under the influence of intoxicants based only on the result of a chemical test that showed a blood alcohol concentration of less than 0.15 per cent. But it is ridiculous to contend that this level is an arbitrary dividing line—that a person on one side of it is under the influence of intoxicating liquor and that on the other side of it he is a sober, safe, and competent driver. Attention is invited to the fact that a majority of persons with as much as 0.10 per cent blood alcohol concentration have been found to have their driving ability materially impaired.*

It is regrettable that in some communities with chemical test programs, the traffic law enforcement agencies or prosecutors have established a policy that drivers with a blood alcohol concentration of less than 0.15 per cent are not to be prosecuted for driving while under the influence, regardless of how badly impaired the driver may seem to have been or how high his level of blood alcohol concentration may have been. This indicates a complete misunderstanding by persons responsible for such a policy as to the meaning of the 0.15 per cent presumptive level. If it is obvious through clinical symptom tests that a motorist's driving ability has been impaired through the use of intoxicants and a chemical test shows his blood alcohol concentration is in that zone between 0.05 and 0.15 per cent, he also should be required to face the corrective action of a court of law. He is just as much a potential danger on the highway as the person whose blood alcohol concentration has reached a level of 0.15 per cent or more. It is the driver whose mental or physical faculties have been thus impaired at whom are directed laws concerning driving while under the influence of alcohol, and he should not be permitted to go unpunished simply because this presumptive standard is not applicable to him. Our courts have pointed out whenever the question has been raised that the level of 0.15 per cent is not a floor on which all prosecutions involving driving while under the influence of intoxicating liquor must be based. They consistently have held that results showing blood alcohol concentrations in smaller amounts are sufficient to sustain convictions when supported by adequate clinical symptom evidence of alcoholic influence.*

RELIABILITY OF TEST METHOD TO DETERMINE BLOOD ALCOHOL CONCENTRATION

Over a period of years scientists have developed different methods of determining blood alcohol concentration by chemical analysis of the blood, urine, or breath. These constitute different methods of chemical analysis which, though varying in procedure, attain the same result—determination of the amount of alcohol in the blood. As examples, there are more than a half dozen different methods of analyzing a specimen of blood to determine the quantity of alcohol in it—each method usually bearing the name of the scientist who developed it, such as the Widmark method, the Heise method. There are also more than a half dozen different methods of determining the alcoholic content of a specimen of urine and thereby the amount in the blood. Likewise, there are four different methods of determining the quantity of alcohol in the breath so that the corresponding blood alcohol concentration can

* See *Evaluating Chemical Tests for Intoxication*, Chicago, National Safety Council, 1952.

be determined by subsequent mathematical calculation based thereon.* These methods of testing the breath employ different chemical techniques in conjunction with the use of devices that are simply small, portable chemical laboratories.

While the various methods of analyzing blood, urine, and breath in common use in this country have attained general scientific recognition for reliability in determining blood alcohol concentration, our courts require proof of the reliability of the particular test method used in each contested case. This must be established by an expert witness thoroughly familiar with the scientific principles of and proper techniques required to be used in the particular type of method employed. At some time in the future, when the scientific principles of some of the more commonly used methods of testing for blood alcohol concentration become more widely known, our courts may be justified in taking judicial notice of their reliability on the basis that it has become a matter of general and common knowledge, as has been decided in connection with the reliability of the radar speedmeter to determine the speed of a moving vehicle. But until that time arrives, any public official about to establish a chemical test program in his community should be prepared to have a qualified specialist available as a witness for this purpose in any contested court cases.

The general rule is that it is essential to prove that the particular method employed is reliable for the purpose of determining blood alcohol concentration and thereby the degree of alcoholic influence of the subject. This factor may be proved by a qualified expert in the field of chemical tests, and the mere fact that a few scientists may disagree with respect to the reliability of the particular method for this purpose affects only the weight of such evidence and not its admissibility. Such proof may be sufficient solely through the evidence of the qualified expert, and failure to show general scientific acceptance of reliability of the particular method does not necessarily require exclusion of such evidence.[9]

The courts have been satisfied with the testimony on the subject by qualified specialists in the field of chemical tests. Typical is a Colorado case. The defendant had produced expert witnesses to refute the testimony of a medical technologist that the particular method used to analyze a specimen of the defendant's blood was reliable. In affirming the judgment of conviction of motor vehicle homicide, the Supreme Court of Colorado said:

> She [the technologist] testified that in the analysis of defendant's blood she used the Nicloux method, which was an accepted method in blood analysis, with the result hereinbefore noted. Her evidence was competent; its weight was for the jury's determination.
>
> There was testimony introduced on defendant's behalf regarding the Nicloux method of blood analysis and questioning the accuracy thereof. . . . Neither we, nor the jury, are sufficiently learned in the art of blood analysis to determine whether the Nicloux method or other of the methods to which defendant's physicians testified, is the better and more accurate method, but the weight to be given such testimony of this witness, as we have said, was a matter exclusively for the jury's determination, and we perceive no error in its reception.[10]

Also typical of the general rule is the Texas case in which the defendant charged with driving while intoxicated had submitted to a chemical test of his breath by

* The alcometer, the breathalyzer, the drunkometer, and the intoximeter.

means of a drunkometer. At the trial, a research chemist at the University of Texas, a qualified specialist in the field of chemical tests, had testified that in his opinion the drunkometer was a reliable device for determining blood alcohol. On cross-examination by defense counsel, the chemist conceded there was dispute among several scientists as to its accuracy. The defendant contended it was error to admit the chemical test evidence on failure of the prosecution to prove general scientific acceptance of this particular type of breath test as being capable of accurately establishing blood alcohol concentration. In affirming the judgment of conviction, the court said:

> The position that it is incumbent upon the State in the trial of the case to prove that the test is scientifically accepted may or may not be correct, depending upon the degree to which the fact is established by scientific research. This Court may recognize generally accepted scientific conclusions, even though there should be some who disagree with them. In all probability a scientist may be found who will disagree with practically every generally accepted scientific theory. We will take judicial knowledge of the scientific fact that the earth is round. At the same time, we know there are still individuals who claim to be scientists who have other theories, even to the extent of holding that instead of living on the outer surface of a globe we live within a globe, and that there are within it sun, moon, stars and all the heavenly bodies which we observe. We would have no trouble in disagreeing with such theory, but it does not destroy the fact that there are others who have a different view. The opinion of such others by no means bars the evidence of a scientific truth before a jury, nor would it preclude the courts from taking judicial knowledge of the truth of it.
>
> Dr. Beerstecher testified that the instrument in question is accurate and he gave his reasons for it. . . . It was accepted as such by the eminent biologist used in this case, who deemed it to be reliable and whose opinion was that such test correctly determined the amount of alcohol found in the breath. . . . He admitted that there are others who disagree with its accuracy. The objection to his testimony, therefore, goes to its weight and not to its admissibility. . . . Our conclusion is that this evidence is admissible, as presented to us in this record, for whatever it is worth, and it was not reversible error to overrule appellant's objection to it.[11]

EVIDENCE OF PROPER TECHNIQUES AND METHODS OF CONDUCTING CHEMICAL TESTS

As in any other case in which evidence of the result of a scientific chemical test of any substance is involved, the attorney seeking to introduce such evidence must prove that a chemical test to determine blood alcohol concentration has been conducted with the highest degree of care and that the possibility of error has been eliminated or reduced to the minimum.[12] This means that it must be shown that the specimen of body fluid or breath of the subject person has been taken properly, safeguarded, analyzed, and identified. This requires technicians trained and skilled in the methods and techniques used to make the tests. They must be capable of and available for testifying at the trial on the detailed procedures followed in making such tests.

The proponent of chemical test evidence must be able to show that any mouthpiece or balloon used in the test was fresh and uncontaminated; that the vials, tubes, and other containers or instruments used were clean; that any antiseptic solution used did not contain alcohol, which could possibly affect the test result; that the chemicals used were pure and compounded to the proper strength; that the chemicals

were fresh or unaffected by age; and that any chemicals or containers that required weighing were properly weighed at the necessary times on accurate scales.[12]

When introducing evidence of a breath test, it is important to show that there was a time lapse of at least 15 minutes between the subject's consuming the last drink of alcoholic beverage and the taking of the breath specimen from him for analysis. During this interval all traces of alcohol in the mouth and throat will have disappeared and the alcohol in the breath exhaled thereafter by the subject person into a balloon or other container will truly reflect the percentage of alcohol in the blood circulating through the lungs. For this reason it is important that the advocate be able to show the subject person was under complete observation during the 15 to 20 minute period immediately preceding the taking of the specimen and that during that time he did not partake of any alcoholic liquids. Otherwise doubt might be cast on the end result, because unless the alcohol is completely eliminated from the mouth and throat before a specimen of breath is taken, it will affect the analysis of the alcoholic content of the breath by showing a higher percentage than is actually in the alveolar breath in the lungs.

Of special importance in the introduction of evidence of the result of a blood test is the need to show that in extracting the specimen of blood from the subject for analysis, the antiseptic used in sterilizing the needle and the skin at the spot from which the blood was withdrawn did not contain alcohol, which might adversely affect the final result. If an alcoholic solution is used for this purpose, there is always the possibility of an inaccurate result. That is the reason every nurse, intern, chemist, physician, or other technician charged with the responsibility of extracting blood for this purpose should always double-check to be sure that the possibility of any such contamination has been eliminated before the procedure is begun.

A California case demonstrated the difficulty a prosecutor may encounter when there is carelessness in this respect. The defendant was convicted of motor vehicle homicide committed while driving under the influence of intoxicants. The physician who had withdrawn a specimen of blood from the defendant had used an alcoholic antiseptic solution in the process but had made no note of and did not remember the specific type of solution. She did not testify to any of the details concerning the type or size of syringe or needle used. Defense counsel made capital of this and used an expert witness who testified in great detail as to how an alcoholic antiseptic could adversely affect the accuracy of a blood analysis for this particular purpose. His testimony also included a statement that the size of the needle could affect the result when such a solution was used as a sterilizing agent.

To save his case, the prosecutor offered his person in open court to the defense expert for an experiment in a blood extraction using an alcoholic antiseptic solution to which defense counsel stated he had no objection. Two different types of withdrawals then were made from the prosecutor's arm during recess and evidence introduced the next day showed but slight contamination due to the use of such a sterilizing agent. The results showed an alcoholic content in one specimen of 0.006 per cent and in the other of 0.016 per cent. The prosecutor had his expert witness thoroughly cover all phases of this particular subject matter on rebuttal, to the extent that the appellate court felt it was justified in affirming the conviction after a long

and thorough discussion of the facts and the required foundations that must be laid for the introduction of demonstrative and experimental evidence.[14]

Also of great importance is the necessity of establishing the chain of evidence proving that a specimen analyzed was actually that taken from the subject person. This is particularly applicable to chemical analyses of breath specimens by means of an intoximeter and of blood and urine specimens. The greater the number of persons who have handled a particular specimen, the greater the chance of contamination or a mix-up, and the more difficult is the task of proving identification in the courtroom. Seldom does the attorney offering such evidence avoid the need to produce on the witness stand each person who had anything to do with the specimen. The necessary production of a parade of witnesses in order to prove this one item has a decidedly adverse psychological effect in court, but without this, far too many cases have been reversed for this one defect alone.* Good procedure in this respect dictates the establishment of a program requiring handling of specimens by a minimum number of persons after they have been taken from persons submitting to chemical tests to determine alcoholic influence.

One of the cases in which an appellate court considered that the chain of evidence concerning the identification of a specimen of blood was well presented was that in which a defendant had been convicted of driving while intoxicated, based primarily on evidence of the result of a chemical test. The arresting officer had taken the defendant to a physician's office where the physician extracted a specimen of blood from the defendant, placed the blood in a glass tube, sealed it, pasted a label on it, and wrote the defendant's name on the label—all in the presence of the officer. The physician then gave the tube to the officer, who turned it over to a second officer who personally delivered it the next morning to the technician who conducted the analysis in the hospital laboratory. Upon receipt, the technician also wrote the defendant's name on the label, broke the seal, and delivered it to the physician in charge of the laboratory, who opened it in her presence and handed the tube back to her for an analysis of the contents. At the trial of this case, the prosecution presented the detailed testimony of all five of these witnesses on this subject and all identified the particular glass tube and label on the witness stand. The court held that the specimen of blood had been properly identified and affirmed the judgment of conviction.[15]

That it is possible to reduce the number of witnesses necessary to prove identification of a specimen is demonstrated in some of the other cases involving this specific point. In a case in which the defendant had been convicted of driving while under the influence of intoxicating liquor, the arresting officer had watched the physician extract a specimen of the defendant's blood at the hospital. The physician immediately handed the vial containing the specimen directly to the officer who, in the presence of the physician, sealed the vial and labeled it with the defendant's name. The officer then deposited the vial addressed to the state laboratory in a United States post office. The state chemist who conducted the analysis received the vial in the mail and personally broke the seal and opened it to analyze the con-

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* Illustrative are *Rodgers v. Commonwealth*, 197 Va. 527, 90 S.E.2d 257 (1955) and *Novak v. District of Columbia*, 160 F.2d 588 (C.A.-D.C.-1947).

tents. At the trial, the prosecution produced only the officer and the chemist to prove identity. They testified on the details of sending and receiving the vial and identified it and the label in court.

On appeal from the judgment of conviction, defense counsel contended that the state had failed to identify properly the specimen of blood as that taken from the defendant because the physician who extracted it from his arm had not been offered as a witness. The court rejected this contention and, in affirming the judgment of the trial court, held that there was adequate identification.[16] Thus by such rulings courts have established that it is not necessary to produce the technician who withdrew or supervised the taking of a specimen of body fluid from the subject person when identification can be supplied by others.

But a word of caution is appropriate here for anyone who seeks to introduce chemical test evidence and might be confronted by a situation similar to that where the prosecutor offered himself as a guinea pig in the California case heretofore mentioned.[14] If there arises in issue the question of whether the proper techniques were followed in obtaining the specimen, the proponent must have available the technician or some other qualified eye witness who is competent to testify on all the details of the procedure followed. It is to be noted in this California case that even though the physician who extracted the blood testified that she had used an alcoholic antiseptic, the police sergeant who had witnessed her withdrawal of the specimen of blood from the defendant's arm testified that he had not seen any antiseptic used and that the defendant's arm was dry when the needle was inserted.

CONCLUSION

Our courts generally require no more in the field of chemical tests to determine alcoholic influence than is required in the introduction of any other type of modern scientific evidence. Law enforcement officials should recognize this fact and be quick to take advantage of the helping hand of the courts in utilizing this scientific method of combatting the situation caused by motorists who unwisely mix alcohol with their gasoline. However, the enforcement officer again should be cautioned that chemical tests to determine alcoholic influence are not accomplished by some push-button gadget. None of the methods developed to date falls into this category. Any chemical test program can be effected only through careful planning and organization and after wise public education. Hard work on the part of everyone concerned is required for such a program to remain effective.

But the results that will accrue from a good chemical test program are well worth the effort. Chemical tests, properly administered, will assure a higher conviction rate in cases involving driving while under the influence of alcohol—thus creating an important deterrent to this hazard of the streets and highways. Equally important, the innocent are protected against unjust charges and conviction.

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Industry Participates in Cancer-screening Program

More than 100 leading pharmaceutical and chemical companies are now participating in the search for new chemotherapeutic agents useful for treating cancer, according to Dr. John R. Heller of the National Institutes of Health. In testimony before the House Appropriations Committee, Dr. Heller, head of the National Cancer Institute, said that about 10 per cent of the total budget for N.I.H. is being spent on cancer chemotherapy research. He considered it a sound investment, pointing out that chemotherapy offers a good chance for the breakthrough to cancer control.

The Human Factor in Automobile Accidents

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The impressive and complex technology of our modern industrial civilization is in no small measure due to the achievements of the design engineer. Certainly, the current generation of hypersonic missiles, supersonic aircraft, and powerful upswept automobiles reflects the highest standards of machine design and fabrication. Unfortunately, the engineer often becomes so involved in the design of a "perfect" machine that he may fail to give full and proper consideration to the none-too-perfect human beings who will have to operate and maintain his mechanical marvel.

One example of how the "human factor" may be neglected in the design of automobiles is shown in the following case. When traveling at high speeds on our modern high-volume turnpikes, freeways, and expressways, it is often desirable for the driver to glance at his speedometer despite the fact that the time spent in such an operation is actually "blind driving." But even if the driver were to be considered accident-prone during the time he takes his eyes off the road, it might seem that this is only a momentary operation, just a part of everyday driving. It might be felt that there is very small possibility that anything could happen in so short a period of time. However, we must consider the millions of automobiles driven every day, the number of times each driver determines his rate of speed during the course of a day, and the traffic conditions that exist today in areas of greatest automobile congestion. Add to this a recent design error wherein an automobile horn ring was placed on the steering wheel in such a position as to interfere with the task of reading the speedometer. Specifically, the horn ring was placed right in the line of sight, leading the eyes to fixate first on the chromium-plated ring. The operator subsequently had to shift his vision to the speedometer dial for the desired reading. The extra time spent on this operation was further increased by a speedometer dial that required time-consuming interpretation on the part of the driver. Such dials should be so simplified and "human-engineered" as to permit instantaneous readings that would allow rapid shifting of the eyes back to the road. Ideally, such readings should be presented to the driver in such a manner as to permit full or peripheral sight of the road at all times.

Another engineering "oversight" occurred when a military truck cab was designed so much narrower than the truck body that the driver's hand signals could not be seen by drivers of vehicles to the rear of the truck. The truck was not, at that time, equipped with directional lights, so there was no adequate means of signaling for a turn or stop to those to the rear of the truck. The driver of this truck also had to twist his body into an accident-prone position while shifting to higher or lower gears. Finally, the seating design served only to transmit vehicular

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vibrations and road shocks undampened to a human resonator, thus inflicting maximum physical damage to the operator when traveling over rough terrain.

The automotive design engineer does have a particularly difficult problem. He has to produce a machine of heavy weight and large size, yet capable of reliable and safe operation at high speeds in close proximity with other motor vehicles and pedestrians. Despite the fact that almost anyone is permitted to drive (even persons missing a limb or with partial motor paralysis), the modern automobile has turned out to be a relatively safe device considering the half trillion vehicle miles traveled

TABLE I

*Nomenclature of Human Factors Engineering**

Title	Typical activities	Related areas or job titles
Human factors engineering	The field of activities wherein special emphasis is placed on determining optimum mode of interaction between man and machine systems of which he is a part	Human engineering Ergonomics Engineering psychology Biomechanics Psychotechnology Applied experimental psychology Biotechnology Aviation psychology
Human factors engineer	A professionally trained engineer with special human factors training and/or experience	Mechanical engineer Automotive engineer Industrial engineer Electronics engineer Electrical engineer Chemical engineer Aeronautical engineer
Human factors consultant	A professionally trained scientist, not an engineer, who is primarily engaged in consulting activities relating to the applied aspects of human factors engineering	Physician Flight surgeon Biophysicist Physicist Sociologist Anthropologist Physiologist Mathematical statistician Psychologist (experimental, physiological, industrial, systems analysis, or human factors)
Human factors research specialist	A research scientist concerned primarily with experimental design and accumulation of basic research data relating to the field of human factors engineering	Any of the above occupational specialties

* Adapted from Peters, G. A., and Seminara, J. L.: Alias the human engineer (as reviewed in Nav. Human Engineering Bull. 25:1–5, Feb., 1957).

each year in the United States. However, this is small consolation in view of the fact that automobile accidents now cause more than 18 times the injury and death to our adolescent and young adult population than did poliomyelitis at its peak. The automotive engineer cannot afford to become complacent regarding his accomplishments when so much needs to be done to reduce the human toll on our highways.

Modern engineering design is now benefiting from the intensive efforts of those who are developing the basic research data concerning human capabilities, limitations, and variability. Safer automobiles are sure to result from studies such as those concerning automotive crash decelerative conditions as they affect the human body (the energy absorption of protective padding and body harnessing, interior design hazards, etc.); the effects of toxic respirable substances drawn into the automobile during varying conditions of ventilation; the best means of facilitating human perception under conditions of daylight, twilight, and night illumination; possible methods of combatting "sleepy-head" driving and highway hypnosis; and the optimum arrangement of instrument panels, control devices, and seating for driver and passengers.

THE SYSTEMS CONCEPT AND TEAM APPROACH

To achieve a significant reduction in the highway accident rate, improvements are necessary in three vital areas: the vehicle itself, its human operator, and the highway environment. For many years, the automobile was designed strictly as a mechanical device, which had to be altered or modified for the human operator. The automobile–human operator–highway systems concept changes this orientation by stressing the fundamental interaction and interdependence of the human being with the automobile. Whenever possible, the limitations and variability of the human element are taken into account or compensated for in early design planning. Even the variation in modes of human-highway interaction vitally affect design decisions, so that the total system functions optimally rather than just the automobile alone.

Such a systems concept in advanced design engineering relies on the team approach for the pool of skill, experience, specialized knowledge, and techniques necessary for that kind of effective implementation of principles as will result in actual product improvement. Probably the real need for a team approach to the human factors problem is that this element in the machine system is the most unpredictable variable, subject to what sometimes seems like poor quality control in its physical and mental attributes, and influenced greatly by stress, fatigue, and a host of environmental conditions.

STANDARDS AND GOVERNMENT REGULATION

Although recent road improvement programs have resulted in such benefits as the limited-access road, wider traffic lanes and median strips, the elimination of grade crossings, road straightening, and improved street lighting, there still remains much to be done in this area. For example, despite the increase in interstate travel, there is, as yet, little standardization of traffic control devices. In one community a three

light traffic signal may be used, whereas in the next town a two light signal may be used. In one city, the driver will have to stop at the crossing or intersection where the traffic light is located, but in the adjacent city he may be required to stop a block away. In some places the red light may be on top of or to the left of the other lights in a signal, but in the next town the reverse system is used (heaven help the color-blind driver who is relying on positional cues!). It has been reported that up to 10 per cent of our male population has some form of deviant color perception,[1] yet there is no universally used standard color notation for the colors used in the traffic lights. Imagine the confusion and accident-proneness of the driver with anomalous color perception when a blue-green "go" signal used in one town suddenly becomes yellow-green in the next. If the red "stop" signal suddenly becomes orange-red, the driver may perceive the signal only as a "caution" light. A difference in color that is just noticeable to the normal driver may represent a very different color to one who is partly color-blind.

The interstate driver may well notice the vast difference in law enforcement from one community to another. In one area there may be almost total disregard of parking regulations, posted speed limits, and road courtesy. In another area the speed limits may be realistic and rigidly enforced, the rights of pedestrians regarded as paramount, and a differing concept may prevail as to what constitutes an "important" traffic violation. The driver may find that the roads are clearly marked for the stranger or traveler in one area but are intelligible only to the local citizenry in the next. If the directional signs are not placed in such a manner as to give sufficient warning for the exits of limited-egress roads, there will always be the occasional driver who will have to make a hasty turn or, if he misses the exit, who will try to back up to the exit. The same driver may come from a state where a red light means "turn right only"; if he proceeds to pull out onto a main thoroughfare in an area where the red light means "stop," those in the oncoming traffic are sure to have an unexpected surprise.

Comparatively little money has been spent on basic research in the field of accident prevention. But we do have many statistics. Generally the statistics are not comparable because of the differing standards and conditions under which they were gathered. For example, we "know" from statistics that a very high percentage of all automobile accidents involve some traffic violation. But it is also a fact that the first thing a traffic or highway patrolman is supposed to do when he "writes up" an accident is to find out if there was some kind of traffic violation. If as much attention were paid to each motorist passing a particular accident location, how many of them would be guilty of some kind of traffic violation? In other words, what are the experimental controls in this type of situation?

Another area that requires some standardization is the training and selection of drivers. Less than half the secondary schools in this country offer driver-training courses, although it is desirable to have mandatory driver training for all adolescents so that the correct approach to driving will be implanted at this early formative age. Some states require a visual examination for the drivers' license, but only once, as if the vision of an 18 year old applicant would remain unchanged for a lifetime. There are also unrealistic statutory requirements that prohibit the "color-

blind" from driving, but as one state examiner explained, "Hardly anyone ever fails the color test." If they did, they would then have to prove only that their visual acuity was "pretty good."

All of this indicates the need for some kind of quasiofficial government agency to sponsor and coordinate intensive research designed to provide more appropriate standards and recommendations pertaining to highway safety. Such an agency is certainly indicated in view of the staggering number of injuries and deaths on the highway, and it is certainly justified in view of the current extent of interstate travel.

Such an agency of the federal government would not have to use any enforcement powers to instigate beneficial changes in automobile design, driver training or selection, traffic control, or highway improvement. Simply by publicizing its recommendations, it would focus attention on areas where changes were deemed necessary. It could achieve some measure of standardization by sponsoring visiting groups, composed of officials from various nearby states, who would serve as "inspection teams" to rate the various aspects of highway safety within a particular state or community. In the process of suggesting improvements within one state, they would assimilate many of the good points and carry back some constructive ideas to their own state or community. The rating process would certainly motivate the officials of each state to reach or exceed the safety standards defined by the agency. This, after all, is what every responsible citizen wants in regard to accident prevention.

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Civil Defense Surveys Drug Stores

Federal agencies responsible for emergency stockpiling of medical supplies plan a nationwide survey to determine whether stocks normally carried by drug stores would be adequate to satisfy neighborhood needs in the event of a serious enemy attack. Interest will center on survival items, such as bandages, dressings, antiseptics, antibiotics, sulfonamide drugs, and biologicals. Defense officials want to find out whether stocks would be ample for civilian needs if sources of supply were bombed out.

New Responsibilities for Health Departments in Motor Vehicle Accident Prevention

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Health departments throughout the nation are being challenged by the twin problems of noninfectious chronic illnesses and accidents.

Human nature being what it is, time has been required for public health workers to make the transition from the control of infectious diseases to the control of noninfectious diseases and accidents.

Today this transition period is approaching an end and the active participation of all public health workers in accident prevention activities may be reasonably anticipated. A growing body of evidence indicates that behind all accidents there is a human cause, which may be found if the search is pursued earnestly enough. Since this is so, it is apparent that the roots of accidents of all types, be they home, industrial, or motor vehicle accidents, stem from the same soil. This soil is composed of physical, physiological, and psychological factors.

Because this symposium deals only with motor vehicle accidents, these human factors will be discussed only as they relate to such accidents.

During those decades when the primary function of health departments was to control infection, a habit pattern of thinking was established that involved increasing the immunity of the host, decreasing the chances of exposure, and removing from the environment the agents whereby infection was spread.

The control of malaria may be used to illustrate the practical application of this pattern. Once the cause of malaria was identified (the malarial parasite) and the mode of transmission was known (the *Anopheles* mosquito), control measures were directed against the host, the environment, and the agent.

The immunity of the host was raised by the prophylactic use of antimalarial drugs; the swamp environment that was conducive to the development of *Anopheles* mosquitoes was drained and sprayed with DDT, or the swamp waters were covered with oil; the mosquitoes themselves were attacked with DDT. As a result of this three-pronged attack, malaria has been, for all intents and purposes, eradicated from the United States.

The effectiveness of the antimalarial campaign was dependent on the development of a body of knowledge that was built up slowly and painfully over many years by scientists, physicians, public health workers, and others skilled in various types of basic and applied research.

Foremost among the research projects were epidemiological studies, which were responsible for the detection of the specific type of mosquito that transmitted the malarial parasite and for other equally important findings.

Favorable to the acceptance of traffic accident prevention responsibilities by health departments is the fact that the same familiar pattern of control, involving the host,

the environment, and the agent, is involved in the prevention of traffic accidents.

The host, man, is the same; the environment, which in the case of malaria was the swamp, in the case of motor vehicle accidents has become the highway; the agent, in malaria transmission the mosquito, has now become, in the case of motor vehicle accidents, the automobile itself.

It is obvious that before the prevention of motor vehicle accidents can achieve the degree of perfection reached in malaria control, a new body of scientifically valid data about the host, the new environment, and the new agent will have to be slowly and painfully collected.

It is in the collection of these data that state and local health departments, assisted by the Public Health Service, can make a substantial contribution to motor vehicle accident prevention.

In New York State one such epidemiological study already has been undertaken. Drivers in Schenectady were interviewed to obtain information with respect to their driving experience, their attitudes toward driving, number of miles driven during given years, physical and mental health, education, and socioeconomic status, as well as accident history. An additional part of the study involved the observation and rating of the driving behavior of sample drivers in the city of Schenectady, who were subsequently interviewed and whose earlier accident history was investigated.

The Cornell crash injury studies are epidemiological in nature and are being conducted in cooperation with eight state and numerous local health departments.

The data-collecting process is an extensive one, in which complete details of injury-producing accidents involving passenger cars are reported on special forms specifying the damage to the vehicle and the causes and conditions relating to the injury. Photographs of the interior and exterior of the damaged vehicles are obtained, as well as complete injury reports by physicians treating the victims. In this manner it is hoped to accumulate reliable data on the mechanical causes of injury and death in automobile accidents and at the same time to assess the influence that design changes may have in modifying the frequency and severity of such injuries.

Other studies, still in the planning stage, include a proposal to provide personal counseling to a group of traffic violators whose driving licenses have been revoked or suspended. The subsequent violation and accident experience of this group will be compared with that of a similar group of violators not subjected to such treatment to determine the effectiveness of this novel approach in the reduction of hazardous driving practices. Another suggestion that has been received favorably is the Northwestern University proposal to make an on-the-spot study of accidents, using a team consisting of an engineer, a physician, and a social scientist. Each will pay special attention to those aspects of the accident that concern him most, but eventually a synthesis of the three aspects will be developed. In this manner it is hoped that clues will be found to relationships between vehicle, highway design, and personality of drivers that in combination are most likely to lead to automobile accidents.

The end result of these studies, plus the many more that certainly will be de-

veloped in the years ahead, will be to isolate and identify the specific host factors—the human factors that are contributing to motor vehicle accidents.

Meanwhile, other studies will be expanding the body of knowledge concerned with environmental factors and agent characteristics that favor accidents.

Health departments traditionally have not been content to remain idle while waiting for the end results of long-range research. Experience has shown that action solely on an empirical basis can save many more lives than inaction.

That is why health departments already are moving ahead on several broad fronts. When queried concerning the use of seat belts in state health department cars, 48 state and territorial health officers replied. The results of the query showed that in 20 states and one territory, one or more agencies have installed seat belts in official cars. Also, six other states reported that they will install seat belts on an optional basis or plan to use them in the near future.

In New York State the Bureau of Motor Vehicles has allotted money to the State Department of Health to conduct epidemiological studies on highway safety, and the Commissioner of Motor Vehicles has turned to the state health officer for advice about the licensing of drivers with certain diseases that may predispose to accidents.

In other words, the die has been cast for health departments to participate in the development of standards for driver licensing.

Other areas of cooperative activity in which health departments may well engage involve the encouragement of behind-the-wheel driver training, the development of medical clinics for the evaluation of motor vehicle accident repeaters, and the improvement of training for members of local emergency squads.

The Public Health Service is planning a study of the types of persons administering first aid or emergency medical care and the kinds of emergency care given for different types of injuries, resulting from various kinds of accidents. We hope through this research to improve the quality of first aid administered.

An article covering this same subject area, written five years hence, undoubtedly would be replete with a recital of new research studies underway and the results of many research projects already concluded.

At this period in the development of health department participation in motor vehicle accident prevention, it is sufficiently encouraging to be able to reiterate the statement that the transition period in public health is nearing an end. Each year the contributions by health departments to scientific knowledge concerning the underlying causes of motor vehicle accidents will increase in quantity and in quality.

British Squeamish on Television Surgery

Some television viewers in England have been upset emotionally by a British program that shows actual surgery in a hospital operating room. A report by 4 doctors says that reactions vary from quiet fainting in a chair to actual falling on the floor. The cause is thought to be the natural aversion of some persons to the sight of blood.

An Urgent Need—More Fact-finding Research for Our Highway Safety Programs

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More than a million persons are injured each year in highway accidents. It is entirely appropriate that a great many proposals be offered and explored as part of the effort to reduce this toll. By the same token, it is vitally important that these proposals be dispassionately evaluated and that available resources be directed toward those offering the prospect of demonstrable results. We must all be cautious in evaluating a small quantity of data displaying a large amount of scatter. We must be aware of the fact that the simultaneous appearance of two conditions does not prove that one is cause and the other effect. In short, our highway safety program must be planned and administered under the guidance of the professional research worker and with the closest possible adherence to fact rather than opinion, however plausible.

Such objectivity has marked the path of progress in medicine. There is much in medical history that bears strong resemblance to our highway safety problem. It is natural that research workers are finding the epidemiological approach ideally adapted to highway safety investigations. Progress in both fields is dependent on fact-finding research such as distinguishes true causative factors from among numerous extraneous influences. Progress in both has been impeded by popular misconceptions. Thus, as medical progress has labored in an atmosphere of superstition and folklore, so also our highway safety efforts have been beset by a general willingness to accept unsubstantiated plausibilities as the panacea for our problems. Like medicine, our highway safety efforts are dependent on popular respect and cooperation if maximum progress in public welfare is to be attained. Accordingly, our research must do more than guide us to greater technological development. It must also provide the information needed to clear the air of whim and prejudice so that we may better enlist widespread participation in the highway safety measures for which voluntary cooperation is required.

The dispassionate and objective evaluation of the many highway safety proposals, so vitally important if we are to direct our energies profitably, depends heavily on fact gathering. If this fact gathering is to provide a statistical basis for valid conclusions, it must be on a large enough scale to be in keeping with the profusion of influencing factors inherent in the complex nature of accidents. That nothing less than proved data can be accepted is better understood when it is considered that the changes in vehicles, highways, and civil regulations that are influenced by such data may involve enormous expenditures of money and human energy. Such ponderous changes must be properly directed from their inception. This is the challenge of an adequate highway safety research program.

To date there have been several outstanding accident fact-finding programs, which

have contributed much to our knowledge of this subject. The work of the Indiana State Police, specializing initially in fatal accidents, and of the Cornell Automotive Crash Injury Research Program in studying the association of car occupant injury with the mechanical features of the car and of the accident is becoming widely known.

The Cornell program is now outstanding in that it demonstrates the level of progress attainable through the cooperation of mutually interested professional groups. This program, in close cooperation with medical and law enforcement authorities at the local level, is now operating in 16 states and has accumulated more than 17,000 automobile accident case histories. Analysis of these data has been uncovering associations between car design and occupant injury, which have provided stimulation to the development of such automotive safety designs as recessed-center steering wheels and swivel mountings for rear-view mirrors. In addition, these findings have proved to be a useful basis for evaluating existing car safety features, such as instrument panel padding and safety door latches, and are showing the way for continued progress in these areas. The Cornell program has also correlated our highway safety problems with research results in the field of aviation. By directing attention to those aspects of aircraft crash studies that are applicable to motor cars, it has been influential in the initial development and acceptance of seat belts for automobiles.

Another area in which mass measurement of facts is most important is that of vehicle performance. It is recognized that improved acceleration, through greater horsepower, has much to offer from a safety viewpoint. As the density of traffic on our highways continues to increase it becomes ever more apparent that increased vehicle agility is needed for such maneuvers as blending quickly with traffic at expressway access points, passing quickly and returning to proper lane, and crossing intersections with least exposure to cross traffic. We need scarcely point out that the accelerative capacity of recent model cars has been substantially increased. It has been seriously questioned, however, whether driver use of this higher performance potential may nullify the safety benefits and may, in fact, introduce added hazards on our highways. It becomes most appropriate therefore to ask whether drivers are prostituting the safety advantages of their more powerful cars by driving faster, by assuming greater passing risks, by becoming involved in more accidents, or by contributing disproportionately to our automotive injury and fatality rates. Several fact-finding studies have been completed that indicate tentative answers to some of these questions.

Prominent among such performance questions are those regarding highway speeds and horsepower. Popular opinion appears to accept the plausible assumption that higher horsepower cars are driven faster. Such an assumption would appear to be supported by the fact that higher horsepower cars are indeed usually capable of somewhat higher top speeds. The advertisements associating horsepower and speed, which were commonplace until recently, tended to confirm this assumption. The work done by Robert Schmidt,[1] of Yale University and the Eno Foundation for Highway Traffic Control, sheds light on the subject and is an excellent example of objective investigation. In this study, 2149 postwar cars were secretly observed by radar on a level, four lane divided highway at times when visibility, traffic condi-

TABLE I

Horsepower and Rate of Speed

Horsepower	Average speed, miles/hr.	85% Speed, miles/hr.	Maximum speed observed, miles/hr.
Less than 100	54.9	61.1	73
100–130	56.6	63.0	76
130–170	57.3	63.2	75
More than 170	57.3	63.2	71

tions, and threat of enforcement offered minimum impediment to a driver's choice of speed. By recording car year, make, and model it was possible to determine the rated horsepower associated with each car speed observation. Analysis of these data included segregation of average and maximum driving speeds into horsepower groups as shown in table I. It would appear from these data that average driving speeds were substantially the same for all cars of greater than 100 horsepower. Cars of less than 100 horsepower were driven only 2.4 miles/hour slower than those in the higher horsepower categories, and this small difference may have been affected by the older, less reliable cars, which tended to fall into this lowest horsepower group. A further consideration of median and modal speeds confirmed the trend established by the arithmetic mean or average speed figures shown in table I. Even those faster drivers who exceeded the 55 mile/hour speed limit conformed to this pattern. In each car group of 100 or more horsepower, 15 per cent were driven at speeds of 63 miles/hour or more, as is shown by the eighty-fifth centile figures. These data display noteworthy uniformity. There is only 0.2 mile/hour difference between the 100 to 130 horsepower and the highest horsepower groups.

As a further measure of possible effect of horsepower on car speed, it is interesting to compare the maximum speeds observed in each of the four horsepower groups. The lowest of these maximum speeds is noted in the highest horsepower classification. The highest speed is found in the relatively modest 100 to 130 horsepower group.

These results are obviously contrary to popular assumption and should be of considerable interest to those who propose bettering our safety situation by legislating restrictions in horsepower. The data do indicate that there are wide variations in individual speed preferences, which are independent of car performance abilities.

What of the faster drivers? Do they constitute a special highway hazard? Popular opinion appears to accept the assumption that fast drivers have more accidents than slow drivers. The validity of this opinion was questioned in a recent paper by Roger Stewart[2] of the University of California Institute of Transportation and Traffic Engineering. This study considered the driving habits and the official California records of traffic citations and accidents for 275 students in psychology classes at the University of California in 1956 and 1957. It was found that the records of the faster drivers did indeed show a significantly higher frequency of traffic citations, including those for speeding. However, there was no correlation between accident experience

and driving habits relating to speed, the "fast" drivers appearing to be involved in accidents no more frequently than the "slow" or "medium" speed drivers. This study was admittedly restricted to a selected group. However, if further research verifies these results as being representative of the general public, it should surely influence a reappraisal of certain of our current legislative proposals and enforcement procedures.

These studies relating to horsepower, speed, and accident experience are recognized as preliminary. The results tend to support the current trend of improved performance. We must nevertheless accept them with reservation until such time as more comprehensive fact-finding studies develop a sufficiently broad statistical basis for final conclusions. In recognition of the need for such broader research, the U. S. Bureau of Public Roads has initiated an 11 state field study, to be completed by March, 1959, using techniques that are elaborations of the Yale-Eno methods previously noted. These techniques are designed to measure the effect of speed on traffic accident experience and, more specifically, on accident, injury, and fatality rates. A significant by-product of this investigation will be a large compilation of up-to-date horsepower-speed data, which should provide an improved basis for conclusions relating to horsepower effects on driver choice of speed. Also available may be horsepower-accident data, which could indicate effects of horsepower on accident, injury, and fatality rates. This activity by the Bureau of Public Roads is most commendable and typifies the role our governmental organizations can play in providing the fundamental bases for continued highway safety improvement.

It is hoped that the current activity in fact-finding research, and in other highway safety programs, may be able to influence a continuation of the established downtrend in the highway death rate. This rate, expressed in deaths per 100 million vehicle miles, is a realistic measure of fatalities in relation to public exposure to risk of highway mishap. It has dropped from 15.1 in 1936 to 6.4 in 1956 and indications are that it has since continued to decline. However, during this period the total number of yearly highway deaths has been fluctuating between 30 and 40 thousand and presently shows no indication of a significant drop. This situation is the result of enormous increases in motor travel, which have vastly increased public exposure to risk of accident. It is sometimes argued that the annual fatality toll should be the only measure of highway safety progress. However, if the 1936 death rate had prevailed in 1956, total deaths would have been 95 instead of 40 thousand as actually occurred. Such a reduction obviously indicates substantial improvement. However, more progress is urgently needed. In the face of this need we find an almost daily growth of highway problems resulting from increasing traffic density. It is therefore appropriate to ask whether our current rate of progress can be expected to cope with these compounding problems in such fashion as will effect a significant reduction in yearly deaths.

It appears to qualified observers that such a reduction is unlikely until our safety research efforts are expanded to give further attention to the broader aspects of accidents, including the role of the driver and of the environment. There is ample evidence to support this conviction. For example, the National Safety Council reports that in 1956 more than 4 of 10 auto fatalities in rural areas were from non-

collision accidents and that in more than four fifths of these, the cars simply ran off the road. Surely, further improvement in vehicles and roads can be expected to help reduce this toll, but it is obvious that our knowledge must be improved regarding the role of the driver in accidents. What do we know of the "driver asleep" problem—mentally and sometimes even physically—that appears to be a major cause of highway accidents on rural roads, especially on the new limited-access, divided-lane highways? Unfortunately we appear to know very little, although some preliminary research is now in progress.

One such preliminary investigation has been designed to determine the feasibility of electroanalysis as a means of measuring driver psychomotor control, co-ordination, discrimination, and reaction. This work has been conducted by the Chrysler Corporation Physics Research Department with the cooperation and assistance of the Detroit Harper Hospital electroencephalographic facilities, headed by Dr. A. J. Derbyshire. In these tests an oscilloscope was mounted in front of the windshield of a stationary car, and the driver subject "drove" by keeping an oscilloscopic trace, which was controlled by the steering wheel, superimposed on another trace, which was controlled by an external source. The environment was made as realistic as possible by shielding the subject from observer activity and by playing recordings of traffic noise and engine sounds. The instrumentation used in the experiment was arranged to provide graphic records of the major functions of the body while performing the assigned task. Electrodermal responses were obtained at the palm of the hand to provide indications of sweat gland activity. An electrode placed on the forearm measured heart potentials to produce an electrocardiogram. Muscle activity and reaction time were obtained from an electromyogram of the lower leg muscle. The degree of physical tension was also measurable from this record. Brain wave activity was traced through two frontal and two occipital electrodes. It was also possible to detect changes in reaction time by measuring the delay between the lighting of a red signal and the start of brake pedal movement. In these tests, encephalographic measurements of the subject appeared to offer advantages in determining driver alertness in that they did not interfere with the subject's natural tendency to become drowsy during lengthy simulated driving periods. As yet, this work is inconclusive. It is described here merely to indicate one research approach, which is attempting to develop a method for studying certain phases of the driver problem.

It is hoped that in time test techniques can be developed for evaluation of such influences on driver alertness, response, and fatigue as the monotonous aspects of tire hum and engine sounds; the protracted sameness of turnpike scenery; the effects of features for improved comfort; the variations of car interior temperature and humidity—to cite just a few. For the present it is apparent that we have barely begun to reach an adequate understanding of the driver contribution to our accident problem. In time, such an understanding may guide us in improving highway safety through better training, licensing, and regulation of drivers and may give us higher return of measurable results for the efforts expended.

Amid the clamor for tighter driver-licensing laws and administrative procedures, do we find the laborious but vitally necessary research program to determine the

relevancy of the various qualifications to be demanded of our drivers? Some preliminary work stands out. We note the commendable program of the American Association of Motor Vehicle Administrators with its driver improvement workshops and the driver improvement clinics set up by some of the administrators in their states. These clinics are intended to contribute not only to immediate improvement but also to knowledge of what constitutes improvement. The relevancy of basic qualifications is also being studied with the aid of such organizations as the New York University Center for Safety Education.[3] Are we giving careful thought to such work and using it as the basis for further programming of research so that within the foreseeable future we will know whether there is significant correlation between accident-free driving and such physical driver qualifications as visual acuity, color sense, depth perception, night vision, glare recovery, field of vision, and multiple reaction time? What are we doing to determine the true bearing on driver qualification of certain diseases and of physical handicaps and deformities? Can we foresee the determination of psychological driver qualifications? How will such qualities be measured and tested and will they be subject to improvement through special training? What of driver training in general? What must we learn to ensure that our curriculums are using the time available for such training to best advantage? Again, we can but be impressed at the enormous amount of work that must be done.

We will all admit that accidents are bound to occur. We must likewise face the fact that improvement in features to minimize automobile injury cannot dispose of our highway injury problem. Even a substantial reduction of accidents, and of injuries in accidents, will still leave us with an enormous problem. Our research activities must embrace yet another field of highway safety—that of care for the injured.

What do we know, for example, of adequate first aid in the care of the injured? Could it be that those states showing lower fatality rates might have the benefit of better medical care in this regard? To what extent is this rate affected by ambulance availability? Among the many ambulance attendants who are not physicians, how beneficial are the services of those who have had first aid training? How significant are the advantages of ambulances that are provided with plasma and oxygen? What possibilities might be offered by the development of special field equipment and techniques similar to the battlefield emergency practices of World War II?

At this point the complex nature of the highway safety problem is evident. No matter what area of the subject is examined, we are confronted with a host of difficult questions that will require laborious research to establish reliable answers. Shall we therefore take the path of least resistance and operate on opinion instead?

Northwestern University does not propose to do so. The University's Traffic Institute has recently established a most commendable three year research program to develop techniques for obtaining really significant information on the nature and causes of traffic accidents through intensive on-the-spot investigation of mechanical, medical, and psychological factors. Dr. J. Stannard Baker, who is directing this program, has described the research goal: "We shall attempt to develop methods for gathering more precise factual information about accidents that will be useful to scientists trying to discover how vehicles, roads and especially drivers and pedestrians

contribute to accidents. . . . The facts we gather will have some value as such but our primary concern is not to collect data; it is to explore the methods of collecting data, assembling it and making it useful." This research will strike at the roots of the highway safety problem. It may well develop the basic tools and methods that could carry us a long way forward in our fact-finding programs. The techniques so developed and subsequently applied on a large scale may provide us with the information needed to effect a major breakthrough in the advancement of motoring safety.

It is apparent that highway safety fact-finding research is indeed on the increase. It should be clear that a much higher level of such activity is urgently needed. This work can be given no better endorsement than by our willingness to accept and adhere to valid findings so obtained.

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Drug Sales Boom

Drug sales during 1957 reached a record high of more than $1.7 billion, according to a spokesman for the pharmaceutical industry. This represents an increase of almost 15 per cent over the previous year and is nearly double the figure for 10 years ago. Ethical drugs, dispensed only on prescription, comprise an estimated 65 per cent of the total expenditure for drugs in this country.

Traffic Court Challenge for Physicians and Lawyers

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Today, as always, there are forces striving for greater traffic safety on our highways and better justice in traffic courts. One of the current problems is how the medical and legal fraternity can assist to achieve these ultimate goals in the immediate future. Many physicians and lawyers have already joined in local community activities for safety and justice and have contributed substantially in time and money. This has been most helpful. The individual participation has demonstrated that there is need for more active participation on the national level from the organizations representing the medical and legal professions. Is it possible for both to join in a collective contribution to the traffic problem?

There are many areas where the two professions meet in connection with the end results—collisions between motor vehicles, fixed objects, and pedestrians. The medical profession must provide first aid, emergency treatment, operative skills, medical attention, and rehabilitation services for the victims of traffic accidents. Attorneys prosecute and defend the criminal actions arising from traffic accidents, litigate the civil rights of the victims, and defend the persons charged with negligence. In addition, attorneys serve as judges in approximately one half of the nation's traffic courts. The rest of the courts have laymen occupying judicial positions.

The paths of physicians and lawyers criss-cross many times after the collisions have occurred and before the final civil settlements have been consummated. The present indications are that these activities of the two professions will continue for many years. Even increased traffic safety measures will not cut off this source of practice for the present generation in either field.

Unfortunately this comparatively close relationship has not always resulted in mutual admiration. The marginal and less ethically inclined members of the two callings have created problems needing attention to safeguard the public. Recognition of the importance of correcting this situation has caused the public relations divisions of the American Bar Association and the American Medical Association to collaborate in joint programs to improve the interprofessional relations.* It is fair to state, however, that these current programs are directed to matters arising and existing after the collision has occurred. This is not enough. The legal and medical professions must unite in a more tangible way to make an effective contribution to the traffic problem.

* The American Bar Association and the American Medical Association have cosponsored a series of six films dealing with the professional relationships of physicians and lawyers. The first in the series, "The Medical Witness," was produced in 1957. The second is entitled, "The Doctor Defendant." The American Bar Association has appointed a special committee to cooperate with the American Medical Association.

It is granted that the traffic problem is a complicated and intricate interweaving of many factors contributing in some measure to the excessive loss of human beings,[1] economic loss suffered through damage to property,[1] and engineering costs to improve facilitation of traffic on streets and highways.[2] Any combination of factors may produce the chain reactions that defeat the objectives of efficient highway transportation with safety.

Neither profession can contribute very much to the engineering aspects of improved highways or traffic control except to support such activities with an enlightened viewpoint as to their need. In this area, the legal profession does render its services in drafting legislation, acquiring rights of way, instituting condemnation proceedings, preparing contractual agreements incident to the construction, maintenance, and control of highways and related facilities. Improved highways with built-in safety do reduce accidents. Some new highways have achieved remarkably fine records over parallel older facilities. Unfortunately the number of miles of improved highways is but a small percentage of the 3,400,000 miles of streets and highways in the United States.[2] Even the much needed National System of Interstate and Defense Highways, commonly called the Interstate System, represents only 41,000 miles of this total—or 1.2 per cent of the nation's total mileage of roads and streets. The authorities estimate that this modernization of the system will save 3500 miles/year. The balance of the nation's highways will produce some reduction as improvements are made, but not enough to achieve similar substantial reductions.

In vehicle manufacture and design, neither profession can be charged with responsibilities for improvement of the engineering phases. However, in this area the medical profession has made a great contribution to the cause of reduced fatalities and injuries by calling attention to the traumatic relationships between vehicle design and the human body.[3, 4] The Crash Injury Research Program at Cornell University Medical School is contributing to improvement of vehicles with safety as an objective.[5] Safety belts, padded instrument panels and dashboards, safety door locks, telescoping steering wheel columns, collapsible windshields, and many other similar devices and improvements are due, in part, to the interest displayed by physicians.[6, 7] The unfortunate part of all this activity is that the desired results are achieved only after the "preventable" collision has happened. The new devices ameliorate the extent and seriousness of physical injury after the impact. They do nothing more than make it possible to have a crash with the odds being in favor of survival without permanent injury. This does not minimize the importance of research in vehicle design and manufacturing efforts. So long as all the interested parties are not engaged in true accident prevention, automobile manufacturers should certainly not diminish their efforts and their active interests in the aftereffects or past clinical phenomena of the traffic collision. Traffic safety experts have indicated that at least 5 to 10 per cent of the total death rate can be reduced through safer engineered vehicles.

The remaining major factor in the traffic problem is represented by the human element—the operator of the motor vehicle and the pedestrian. Here, both the legal and medical professions have a direct interest and immediate responsibility. This

is an area in which their particular skills are needed to provide intelligent guidance in the control and regulation of the driver and the pedestrian. If they work together, physicians and lawyers can make an unusually high contribution to the community welfare not only as professional men and women but also as citizen leaders. It may be suggested that they, too, should be reminded that some day they may be involved in one of the "preventable" collisions either as a victim or as the violator or witness cited to appear before a traffic court judge. Whether viewed from a personal or professional interest, the present-day problems of traffic accident prevention need the combined attention of both professions. Together their collective efforts in the education and enforcement areas may well spell the difference between success and failure in the immediate future.

The daily conduct of physicians and lawyers in the operation of a motor vehicle, their habits as pedestrians in walking about the community, and their views on driver education and traffic law enforcement condition the attitude of many persons they encounter in their professional capacity. Even this simple daily activity assists in creating the proper traffic safety climate in their community and in their homes. If physicians and lawyers do not understand the purposes of driver education and traffic law enforcement, they may unwittingly destroy or retard the wholesome attempts in this direction by the educators, judges, prosecutors, police, driver-licensing authorities, legislators, and governmental officials.

As professional leaders, their knowledge is needed in every area of education and enforcement. No matter how remote it may seem at this moment, there is a relationship between the medical and legal aspects of educating, regulating, and controlling drivers and pedestrians. To explore this approach it will be necessary to understand what is meant by the catchwords, "can't's," "don't's," and "won't's."

If a person appears in traffic court, there is a strong possibility that he may be classified as a "can't," "don't," or "won't."

These words are used by traffic safety experts to describe certain well-defined characteristics pertaining to traffic violators.[5] Judges of traffic courts have been asked to use these categories in diagnosing the violator's difficulty with traffic laws.[9] This classification of violators may well serve as the key for cooperation between the legal and medical professions in traffic safety activities.

A "can't" traffic violator is one who cannot operate (or walk) properly because of a physical or mental defect.

The "don't" person is one who lacks (a) understanding of the objectives of traffic laws; (b) operative skill in the handling of the vehicle; and (c) judgment with respect to the ability of the car or his reaction to cope with the physical laws of motion.

The person who does not respect authority or whose attitude toward traffic rules is faulty is considered to be a "won't."

The purpose of regulation and control is to achieve voluntary compliance with the established rules of conduct on the use of streets and highways. It is possible to condition some persons to accept this responsibility through education alone. This is the long-range approach. Other persons will have to receive their desire to respect such rules through enforcement methods encountered in their contacts with driver-

licensing authorities, police, prosecutors, and judges. It is immediately obvious that any failure on the part of education or enforcement to create this conditioned traffic safety climate will result in an unhealthy traffic accident situation. Since no community in the United States can seriously claim to have reached its zenith in traffic safety, it is safe to state that there is need to re-examine the techniques used to achieve the desirable objective.

The first tool employed in this behalf is legislation. Every state has undertaken to codify the official and legislative viewpoints into traffic legislation. Unless the latter is predicated on the provision of the Uniform Vehicle Code,[10] it is not always easy to ascertain the circumstance that produced such regulation or control by statute. This legislation must be understandable, it must be easy to administer, it must be enforceable to secure compliance and able to command respect as a necessary regulation.

The model provisions contained in the Uniform Vehicle Code attempt to meet this test. The code has been revised from time to time because of changing conditions.* In this process it has been necessary to reconcile conflicting viewpoints of special interests, and the result is compromise model legislation. This process has not developed a maximum standard. In many respects the code represents a minimum set of standards except for the "rules of the road." However, the Uniform Vehicle Code is the only legislative measuring stick used in determining the adequacy of motor vehicle laws in each state.† Likewise, the Model Traffic Ordinance is the same type of guide for each municipality.[11]

Since all legislation is a subject peculiarly within the orbit of the legal profession, it is best to confine further discussion to that portion of the Uniform Vehicle Code that requires the special qualities of the medical profession. This is found primarily in the driver-licensing provisions of the code.[10] This is one area where upgrading the standards will produce desirable results. The 49 states, the District of Columbia, and Hawaii have enacted driver-licensing laws. A recent report[12] states that

> all states except one require all new applicants for driver licenses to pass vision, road and sign recognition, law and driving tests, and an increasing number of states are requiring personal appearance and passing one or more of the standard tests for renewal of licenses. Periodic renewal of licenses is now required in 47 states. Thirty-four states are considered to have enacted at least the basic parts of the model law on driver licensing contained in chapter 6 of the Uniform Vehicle Code. A prime objective of the period immediately ahead should be to strengthen and make more uniform the driver licensing laws of all jurisdictions.

A nice sounding law conforming in many respects to the code does not always indicate the kind of administration given to the subject. It is in this area that politics plays an important part in establishing the level of administrative machinery. Political tinkering may vary from direct interference in individual cases to the withholding of the necessary funds to permit functioning in the nationally approved manner. If all driver-licensing authorities were able to perform their

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* The Uniform Vehicle Code was first approved in 1926 by the Second National Conference on Street and Highway Safety. It was revised in 1930, 1934, 1938, 1952, and 1956.

† Comparative analysis workbooks on the Uniform Vehicle Code are made available to all states through the National Highway Users Conference, Washington, D. C.

tasks properly, there would be very few "can't's" permitted to operate. This group should be detected in the initial driver-licensing process. Only those becoming physically and mentally incapable of operating properly between renewal periods should ever come to the attention of the traffic court judge.

Here is a broad area that will benefit from the cooperative efforts of the administrator, physician, and lawyer. The key member of this team is the physician. He can advise the lawyer on the defects that should act as a bar physically and mentally to obtaining a driver license or to the continued use of the privilege to drive. The lawyer can prepare the legislation to guide the administrator. The administrator can then apply the guideposts and supplement them with administrative practices to achieve maximum effectiveness.

The medical profession is peculiarly well qualified to develop the guides to be used by the administrators in selecting the physical and mental defects that should be the basis for denial of a license or removal of a licensed person from the roads and streets. This same informative material should be made available to every traffic court judge to assist him in his work in the courtroom. It will also be of value to the police and prosecuting officials in their enforcement work.

There are many other questions needing the attention of the medical profession, such as: Should a medical panel pass on each application for a drivers' license? Should a screening program be developed to limit the number of applicants referred to a medical panel for examination? Should a training program for drivers' license examiners be revised to include basic instruction on how to apply such a screening program as to doubtful applicants? Should an upper age limit be established to require periodic medical and physical examination at renewal time? Should the periodic re-examination be a complete or partial physical check-up? Should a mental check-up be included in the re-examination? Should the examiner receive basic instruction on how to detect some or all of the mental incapacities? Should the referral for a mental check-up incorporate attitudinal observation during the road test? Should the medical panel include psychiatrists, psychologists, sociologists, driver safety educators, or members of the public?

Should the legal and medical professions collaborate now in the preparation of legislation that will require all physicians to report physical and mental defects of their patients to the driver-licensing authority? Should this requirement be coupled with an immunity from civil suit or criminal prosecution from the patients referred whether or not they lose their driving privileges?* Should this referral be predicated on implied consent legislation incorporating this restriction on the initial issuance or renewal of the drivers' license?

Then what exceptions are to be created to permit operation of motor vehicles by those persons who compensate for their physical or mental defects?

Where and in what manner are all physicians to receive the necessary indoctrination to fulfill these responsibilities? Where and in what manner are physicians to

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* S. B., New York, 1958, provides, *inter alia*, immunity from civil suit or criminal liability for all physicians extracting blood samples at the direction of an enforcement where a person is accused of being under the influence of intoxicating liquor.

learn to add "don't drive" in proper cases to other "don't's" such as "don't smoke" or "don't drink"? The medical guideposts developed will be of great assistance to lawyers in preparing legislation or administrative regulations.

In the performance of this task the lawyer will be required to protect the individual's rights from arbitrary or capricious abuses in the exercise of such powers. He must also prevent zealous crusaders for traffic safety from upsetting the fine balance that must be maintained between regulations for the benefit of the public and the driver's rights as an individual. Traffic court judges will benefit from this legal and medical cooperation. They are staunch supporters of stricter driver licensing and preventive driver selection. They know that better driver selection will increase the prospect for a reduction of violations and a resulting decrease in accidents. The judges are at the end of the line with respect to this entire problem. Every person they meet is someone who has run the entire gamut of motor vehicle regulation prior to coming to the traffic court. The time spent in front of the judge is not too long in the average traffic case. It is during this time interval that the judge must ascertain from all that is said and done by the violator and other testimony whether he is presented with a "can't," "don't," or "won't." If the person found guilty at a hearing or trial is a "can't," how does the judge identify and recognize the physical defect? The mental defect? Judges everywhere are anxious to have the medical profession supply some guideposts to assist them in arriving at their judicial diagnosis. It is readily apparent that in this one broad aspect there is much that can be developed cooperatively for the guidance of officials, legislators, administrators, and judges.

Physicians are also well situated to impress on their patients that certain "acute or chronic conditions may endanger their safety on the road."[12] They may also use this opportunity to advise against driving while under the effect of drugs or chemicals. This is an educational approach and may be convincing enough to keep such persons out of the traffic court.

However, the opportunity for the medical profession to assist in the identification and recognition of the "don't" violators is limited. The judges depend more on the information received from the apprehending traffic officer and the statements in explanation submitted by the accused. In this category, lack of understanding of rules and regulations can become readily apparent to the judge. He will also be able to recognize the inexperienced driver who lacks manipulative or operative skill. The driver's lack of judgment because of failure to obey the laws of motion and physics will usually be revealed in the hearing or trial. Once these cases are analyzed, the proper corrective and educational steps to be applied by the judge are quite clear. Here, traffic court schools or driver improvement courses aid materially.

However, the court will rely more on the medical aspects in dealing with the "won't" drivers. They form two broad classes whose characteristics become apparent in the courtroom. One includes drivers with a disrespectful attitude toward the court, the laws being enforced, the government, and everything associated with the democratic process. The other group is composed of those who enjoy freedom from physical defects, understand the rules of the road, possess better than average skills, recognize the need to obey the physical laws, and generally respect the courts,

but who just refuse to obey traffic laws because of a faulty or improper attitude. Here the behavioral sciences must assist in the solution. Good results have been achieved for the traffic courts in Chicago, Cleveland, and Detroit through their psychiatric clinics. It is obvious from the results obtained that a high screening level has been used by the judicial referrals.

In this area the courts are desperately in need of more information and guidance, which will be valuable, even if the medical profession finds that it cannot assist in a tangible manner to reduce the screening level for mental or attitudinal examinations by judges. The information acquired by physicians in arriving at answers for driver-licensing authorities will be valuable in the courtroom and in hearings conducted by administrative officials, after reports of court convictions coupled with recommendations for suspension or revocations. The problems in this area of inquiry will be responsive to changing conditions of an economic, social, political, and moral nature. The team approach to their solution will be helpful. Both physicians and lawyers should be on the team to develop the best criteria.

The court's opportunity for utilizing this analytical approach is somewhat limited by the failure of the legislative and executive branches of government to supply the needed tools for the administration of justice.[12] Among these are adequate, dignified, and impressive court surroundings and clerical personnel who are qualified and trained to assist the judge and serve the public. Competent prosecutors and well trained police are essential. Adequate records and close cooperation from the driver-licensing administrator in furnishing prior records are essential. The medical profession can lend its support to the improvement of traffic courts. Its influential voice may determine the issue in many communities. Its appreciation of the need for more judges and prosecutors alone may be all that is needed to provide the courts with better, unhurried opportunities for analysis of violators. It will permit them to hear more cases rather than shunt them over to the "cash register" atmosphere of the violations clerk. As each accused appears in court he should be informed about procedure in the courtroom, his rights as a defendant, the purpose of traffic laws, and the meaning attached to a plea of not guilty or guilty. Only by such preliminaries, after the formal opening ceremony of the court by a robed judge, can the responding driver realize the gravity of his unintentional, unthinking actions on the highway.

If the accused pleads guilty, the court must take enough time to inquire into all the facts and circumstances. Otherwise, the guilty plea becomes a mask to hide the possibly serious aspects of the driver's illegal behavior in operating his vehicle. The judge must also use this brief appearance to observe attitude, conduct, and demeanor. With all this he must arrive at his considered penalty, which must not only deter the defendant from future violations but also serve to warn the community of potential violators. This penalty must be corrective, educational, and persuasive in securing future voluntary observance.

All these considerations are also present in cases of a plea of not guilty. The only difference is that greater opportunities for observation by the judge are present in the case where evidence is adduced on behalf of the state and the defendant elects to present a defense. The judge will have an insight into the defendant's reactions

while he is re-enacting a narrative description of the driving actions that caused the officer to charge him with a violation. If an accident is involved, an even longer opportunity is usually available to observe the defendant. If no accident or collision was involved, the appearance of the violator in the courtroom is even more important, since his experience and that of others may determine their future attitude toward traffic laws and their enforcement by courts. Making the moment of decision meaningful for both the judge and the violator is one of the many objectives of the American Bar Association Traffic Court Program.

There may be occasions when a physician appearing as a defendant in traffic court will welcome this improved type of court performance. The professional status of the physician will not entitle him to special consideration or preferential treatment in the traffic court. At the same time, the physician has a duty to himself and his community to resist unfairness in the enforcement process whether it be by the officer, prosecutor, or judge. He should not succumb to the temptation to pay a fine at a violations bureau by pleading guilty when a reasoned opinion says "I'm not guilty and I ought to go to court." This will afford the physician a splendid opportunity to appraise the traffic court system. If dissatisfied with this experience, then he should lend a hand to the local bar association to correct the situation. If the local bar association is not immediately interested, he may contact the American Bar Association Traffic Court Program.* Something will then be generated in the direction of better justice in the traffic court. The physician should also advise patients to follow his example, when justification exists, but support the enforcement program when the traffic ticket was properly issued. The physician can do much to prepare the patient, friend, or member of his family to assume responsibility for illegal driving errors. A personal appearance in traffic court should be educational and corrective.

It should always be remembered also that when a physician is personally involved in an accident, he must be careful to take every precaution that any other person is required to undertake in such circumstances. He must protect his rights concerning litigation that may result from this event and should insist on a complete investigation of the collision by the police, obtain the names and addresses of all witnesses, whether occupants or bystanders, and gather as much information about the physical surroundings as possible. All of this will prove to be of value in disposing of the civil aspects before or after filing suit.

Again the physician must be alert to the problems created by the civil aspects of accident cases. Trial calendar congestion is due primarily to the overwhelming number of personal injury or wrongful death cases filed in the courts. The end result is long delays in the disposition of such cases. This unfortunate situation is another area in which there is growing recognition of the need for the legal and medical professions to join hands and seek a workable solution.

The public has a substantial interest in and would welcome any development growing out of this cooperative effort. The number of persons who are involved in

* A check list of traffic courts is available from the American Bar Association Traffic Court Program, Chicago 37.

TABLE I

*Calendar Congestion in 12 Critical Court Areas**

Court	County	City	Delay, mo.
Superior	Cook	Chicago	54
Supreme	Queens	New York	39
Supreme	Bronx	New York	38
Superior	Fairfield	Greenwich, Conn.	34
Supreme	New York	New York	31.4
Common pleas	Cuyahoga	Cleveland	30
Circuit	Cook	Chicago	30
Superior	Suffolk	Boston	30
Superior	New Haven	New Haven, Conn.	27
Superior	Hartford	Hartford, Conn.	27
Common Pleas	Allegheny	Pittsburgh	26
Superior	Hampden	Springfield, Mass.	21

* Listed in order according to the length of time it took to dispose of personal injury cases. Statistics taken from Reports on Calendar Congestion prepared by the American Bar Foundation Study.

civil litigation arising out of motor vehicle accidents is constantly growing. The delays incident to this may be best illustrated by the calendar congestion reported in 12 critical court areas, as shown in table I.

This clogging of the administration of justice concerns both lawyers and physicians. The latter have seen the battle of medical experts degenerate into hopeless conflict, and demands are being made for "impartial medical experts." There has been a similar public clamor for the enactment of financial safety responsibility laws, compulsory insurance, unsatisfied judgment funds, and other plans to compensate the victim of the uninsured motorist—the indigent tort-feasor.

The financial stake of the automobile casualty insurance business in motor vehicle accidents is tremendous. Its influence should be impressed on the members of the legal and medical professions. This would be an excellent beginning for medical-legal cooperation and could develop the pattern that could emerge as the basis for a broad "across-the-board" program.

Billions of dollars are being spent on improving the highways.[2] No one dares dream of what will be the ultimate cost of engineering safety into the roads and streets. Whatever the cost, it is justified for all purposes. The automobile industry, with its keen competitive interest in vehicle design, is expending many millions of dollars to incorporate approved safety features and to encourage research.[6, 7]

But nowhere, apparently, is there a real desire to support the kind of activities that will improve the "human element."* Perhaps a combined program carried on by physicians and lawyers may furnish the needed spark to attract the required funds.

The medical fraternity is the bulwark between the life or death of the traffic

* There are some exceptions, such as the recent Special Report on the Williamsburg Conference, Feb. 23–28, 1958, sponsored by the President's Committee for Traffic Safety and financed under grants from the National Institute of Mental Health, Bureau of Public Roads, Alfred P. Sloan Foundation, and Automotive Safety Foundation, Research Review, Traffic Safety 2 no. 2, National Safety Council, Chicago, June, 1958.

accident victim and the legal fraternity is the bulwark between the rights of the defendant and his just punishment as a traffic violator. The American Medical Association and the American Bar Association are servants of the public and have an obligation to serve it better.

It is suggested that one way to do this is to hold a joint medicolegal symposium on the traffic problem at an early date. The presidents of the American Bar Association and American Medical Association should assert the leadership required for this joint enterprise. Together the two professions can develop the factual background needed for remedial changes in the control and regulation of the most important factor in the traffic accident problem—the "human element."

In spite of suggestions that indicate that some scientific devices may displace the human aspects, it is well to remember the airplane pilot who was asked if he thought his profession was here to stay, in view of the developments in guided missiles and satellites. After due deliberation, he indicated he thought human pilots would continue to be used, for, as he put it: "Where else can you get such a versatile nonlinear servo-mechanism, producible in quantity, with so little capital investment, by such low grade help, and such pleasurable means?"[14]

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DILUTE CONCENTRATIONS OF NEW ANTIBIOTIC EFFECTIVE. Concentrations of kanamycin, a new antibiotic, as dilute as 2 μg./ml. will kill germs resistant to penicillin, according to a report by U. S. Food and Drug Administration scientists headed by Henry Welch, Director of the FDA's Division of Antibiotics. In tests against Staphylococcus aureus, most frequently involved in hospital epidemics of antibiotic-resistant germs, 10 strains isolated from ill persons were killed by dilutions varying upward from 2 to 7.8 μg./ml. The report was made at a two-day conference on kanamycin held recently in New York City.

SYRINGE HOLDER FOR BLIND DIABETICS. A simple, inexpensive syringe holder that enables the blind diabetic to administer his insulin by himself has recently been designed (Am. J. Nursing, May, 1958). The holder is made of aluminum and has a slide and stop that can be locked in any desired position to measure a specific dose. By sense of touch alone the blind diabetic can be taught to adjust the holder for the required dose of insulin.

EVAPORATION OF MILK. Evaporation or drying of milk does not significantly lower essential fatty acid levels, report James et al (Lancet 1:502, 1958). They base their findings on determination of linoleic plus linolenic acid values after vacuum evaporation or roller drying. They also found no evidence that an essential fatty acid deficiency is related to idiopathic hypercalcemia in infancy.

ASPIRIN MOST WIDELY USED DRUG. A recent report from the U. S. Department of Commerce shows that more aspirin is produced in this country than any other drug. Yearly production of aspirin, according to the report, jumped from 6.4 million pounds in 1940 to 16.6 million pounds in 1956 with no sign of leveling off. Penicillin production for the first eight months of 1957 was up 26 per cent over the same period in 1956. Streptomycin output increased 23 per cent and dihydrostreptomycin, 5 per cent during the same period, with large amounts (37 per cent of all SM; 48 per cent of all DHSM) going for export. Production of sulfonamide drugs during the first eight months of 1957 totaled 2,448,000 pounds, a 20 per cent gain over the same period in 1956.

NEW TECHNIQUE FOR ENLARGING SHRUNKEN BLADDER. Urinary bladders shrunken as the result of disease or chemical injury can be enlarged by a new surgical technique, it was reported before the recent meeting of the American Urological Association in New Orleans. In the procedure, known as the "cup patch" operation, a segment of the ileum is removed and cut lengthwise so that it lies flat. The edges are sewn together so as to form a cup or patch, which is then sewn to the bladder. When healed, the bladder and patch act as a unit in voiding the urinary bladder. The chief advantage of the method is that it leaves no residual urine, such as may occur in other types of operations using the ileum to enlarge the bladder.

SUSCEPTIBILITY TO DISEASE. Susceptibility to disease can change from day to day, and even from hour to hour, according to René J. Dubos (Rockefeller Institute, New York City). Such alteration is in response to physical, chemical, and emotional stimuli to the individual. There is increasing evidence that response to infection, especially in the early stages, can be strongly altered by such factors as fasting or abnormal diet, injection of various hormones, shock from injuries, and psychic disturbances, he says. Under usual circumstances, normal individuals achieve, through evolutionary adaptation, some sort of environmental equilibrium with the disease-producing microbes.

HYDROXYCHLOROQUINE PREFERRED FOR LUPUS ERYTHEMATOSUS. Hydroxychloroquine (Plaquenil, Winthrop) is as effective as chloroquine in treating discoid lupus erythematosus and is less likely to cause side effects, according to a report in Brit. J. Dermat. (70:176, 1958). Ten patients with severe lupus erythematosus of the face were treated for six months with hydroxychloroquine. After treatment, 2 patients were clear except for slight scarring in 1 case; 5 patients were greatly improved; and the remaining 3 showed some improvement. The only side effect observed was dyspepsia in 1 case.

SAFETY CAP FOR DRUG BOTTLES. A new safety device to prevent accidental ingestion of aspirin and other toxic medication by infants and young children has been endorsed by the accident prevention committee of the American Academy of Pediatrics (Arizona Med., June, 1958). The device is a plastic closure for standard proprietary and prescription product bottles. Although the cap can be removed quickly and conveniently by adults, it presents a virtually fool-proof obstacle for the inquisitive child of 5 years or younger.

Nausea and Vomiting of Pregnancy: Treatment with Bendectin

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Until recently, the recommended treatment of nausea and vomiting associated with pregnancy was much as it was outlined by Williams[1] more than 50 years ago, in the first edition of his classical text:

> The fact that a large proportion of the remedies in the pharmacopoeia have been recommended for the treatment of the vomiting of pregnancy, is abundant evidence that drugs are often unavailing. Satisfactory results are sometimes obtained from one or other of the following: Capsules containing ¼ grain of nitrate of silver and 2 grains of pepsin, or 2 grains of menthol, dilute hydrocyanic acid, small doses of cocaine, drop doses of the tincture of iodine, subnitrate of bismuth, or oxalate of cerium, either in the form of 5-grain powders or the effervescent preparation. Occasionally the first remedy prescribed will lead to a marked amelioration of the symptoms, while in other cases the whole gamut may be prescribed in succession without appreciable result.

More recently, the chemotherapeutic advances seen in other fields have been accompanied by the development of new drugs that are commonly effective in the control of nausea and vomiting of pregnancy. Notable among these advances have been pyridoxine,[2] dimenhydrinate (Dramamine),*[3] and a combination of meclizine dihydrochloride and pyridoxine hydrochloride (Bonadoxin).†[4]

The compound made available most recently for symptomatic treatment of this disorder is Bendectin.‡ Each tablet is a specially coated combination of 10 mg. each of the antispasmodic dicyclomine (Bentyl),§ the antihistamine doxylamine (Decapryn),§ and the familiar pyridoxine. The special coating is supposed to release the medication a considerable period of time after ingestion, making possible the treatment or prevention of morning symptoms by oral administration the night before.

Nausea associated with functional bowel distress is commonly relieved by dicyclomine.[5–10] The relative efficacy of a compound containing dicyclomine would tend to enhance the commonly held view that there is a strong emotional factor that contributes to or causes nausea of pregnancy. Previous studies on the antinausea properties of doxylamine alone have been concerned only with the treatment of nausea resulting from radiation sickness. In this field, doxylamine appears to be relatively effective.[11] The controversial place of pyridoxine as an adjunct in the

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* The trade name of G. D. Searle & Co. for dimenhydrinate is Dramamine.

† The trade name of J. B. Roerig & Co. for a combination of meclizine dihydrochloride and pyridoxine hydrochloride is Bonadoxin.

‡ The trade name of Wm. S. Merrell Co. for a combination of dicyclomine, doxylamine, and pyridoxine is Bendectin.

§ The trade name of Wm. S. Merrell Co. for dicyclomine is Bentyl; for doxylamine, Decapryn.

treatment of morning sickness may have been clarified by the demonstration that a functional deficiency of vitamin B_6 frequently occurs in pregnancy: it is more common in patients who complain of nausea than in those who do not, and it is corrected by the oral administration of less than 10 mg. of pyridoxine daily.[12] If the specially coated combination of these three medications could be administered orally the night before, and if the vast majority of patients would be more comfortable the next morning, tentative confirmation of the several theories outlined would be available.

THE TEST PATIENTS

Our preliminary experience with Bendectin was so encouraging that we expanded the study to include private patients. Because we did not feel justified in depriving them of the possible benefit of the combination, we made no attempt to set up a control study that would involve the use of placebo medication. Since 1954, the combination has been tested in a series of 300 pregnant patients, all of whom complained of nausea or vomiting in varying degree as follows: 32 per cent, +, sufficient nausea, usually morning or evening, severe enough for the patient to complain without being asked leading questions; 35 per cent, ++, patient nauseated all day, but there is no vomiting; 25 per cent, +++, nausea and vomiting; 8 per cent, ++++, nausea and vomiting severe enough to produce loss of weight, weakness, confinement to bed, and hospitalization.

Of these patients, 75 per cent were experiencing their first or second pregnancy; the remaining patients had delivered two or more children previously.

SYMPTOMATIC RESPONSE TO BENDECTIN THERAPY

Of the total of 300 patients, complete symptomatic relief followed Bendectin therapy in 276; however, this was accomplished within the first 10 days in only 97 of the patients. By the end of 10 days of treatment, complete relief was experienced by 179 patients, and by the end of 21 days, a total of 276 of the 300 patients were completely relieved. The dosage was 1 tablet at the hour of sleep, repeated whenever needed. It is possible that a dosage of 2 tablets at bedtime, suggested by Nulsen,[13] might have produced a more rapid response in a higher percentage of patients.

Of the remaining 24 patients, 18 experienced partial relief: they were relieved of vomiting but did complain of occasional nausea. It is interesting that all these patients were highly emotional. The factors that appeared to be responsible for anxiety or depression were the following: parental disapproval (pregnancies too fast), predisposed fear of pregnancy, fear of delivery, premonition that they would not survive delivery, phobias concerning sex and childbirth, infidelity, and illegitimacy.

It is possible that some of the new psychopharmacological agents would have been helpful in combination with Bendectin in many of these 24 patients.

In the series of 300 patients there were 6 failures. It is interesting to speculate on some of the factors that may have contributed to these failures. Three patients had a preconceived idea that medication is more effective by injection than orally. This

may have been due to failure to respond to oral therapy with other agents on previous occasions. Even so, 1 of these patients who was convinced that Bendectin would not work was partly relieved almost immediately after the first dose. The other 3 patients all objected to the use of investigational supplies. Either they resented being "human guinea pigs" or they felt that medicine was of no value if they did not have to pay for it. Perhaps these patients will return next year with similar symptoms; if so, it will be interesting to see whether they respond better to the commercial product than they did to investigational supplies.

NAUSEA DUE TO OTHER CAUSES

In the series of 300 pregnant patients were included a number of physicians' wives. During the period of three years of study, the antinausea properties of Bendectin became fairly well known to a small group of physicians and their families. As a result, supplies were requested for various purposes, usually for use personally by these physicians or members of their families. The observations summarized here represent uncontrolled clinical trials. They are reported only because the drug was surprisingly effective. Since it was also more effective than any other medication tried previously in the pregnant patients, it is possible that it may be a potentially useful compound for the symptomatic control of virtually any type of nausea.

Motion Sickness. Eighteen patients (10 children and 8 adults) were given 1 or 2 of the specially coated tablets of Bendectin an hour before departing on a trip. All had experienced motion sickness previously on similar trips. None had any trouble after taking the drug combination.

Radiation Sickness. Complete relief was obtained in all 6 patients suffering from nausea and vomiting associated with radiotherapy. The dosage was 1 tablet morning and evening.

Functional Bowel Distress. Bendectin was given in a dosage of 1 tablet twice daily to 25 patients suffering from nausea and vomiting due to dietary indiscretions, change of dietary habits associated with travel, possible "virus infections," or less well-defined clinical entities. Symptomatic relief was obtained in all 25 patients.

Dysmenorrhea. The drug combination was tried in 24 patients whose nausea and vomiting appeared to be associated with dysmenorrhea. As in the other nonpregnant patients, the usual dosage was 1 tablet twice daily. Vomiting and nausea were relieved in 18 of the 24. Five of the 24 patients also reported some relief from the pain, but in 19 the usual manifestations of dysmenorrhea were not helped.

Premenstrual Tension. In a series of 30 patients, symptoms of premenstrual tension were relieved in 26. One tablet of the drug combination was used at the hour of sleep and repeated the next day at noon for a period of two weeks, and was stopped the day menstruation started. The encouraging preliminary results will be the subject of further study and will be reported later.

SUMMARY AND CONCLUSIONS

Bendectin has been given orally to a series of 403 patients, 300 of whom suffered from nausea and vomiting of pregnancy. The dosage is 1 or 2 tablets, taken at the

hour of sleep and repeated as needed. Complete relief was obtained in 276 of the 300 patients and relief from vomiting (with nausea persisting), in 18 others. There were 6 failures. The other 103 patients received 1 tablet of the drug combination twice daily for nausea or vomiting associated with motion sickness, radiotherapy, functional bowel distress, dysmenorrhea, or premenstrual tension. The gastric complaints were usually relieved; pain of dysmenorrhea was helped occasionally; and symptoms of premenstrual tension subsided in 26 of 30 patients.

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VA Intensifies Cancer Study

All Veterans Administration hospitals are participating in a long-term survey of cancer patients, estimated to number about 25,000 cases annually. Data compiled will include information on diagnosis, treatment, and results. Reports submitted will include results on all patients treated for cancer as well as follow-up studies after discharge from the hospital.

Fashion as Dimension and Symptom*

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Our thesis on fashion is simple. Fashion is in every epoch not something arbitrary and capricious but an important historical dimension. Though externally fashions, whether in hats, automobiles, songs, or dances, may be superficial and frivolous, intrinsically they reveal the biological and historical reasons governing the social habits and feelings of human beings in every epoch. Fashion is an external reflection of the biological mechanism that regulates the historical development of human life. The woman who today hides her graceful figure in the amorphous monstrosity called the "sack" or the young man who prefers the temporary *petit mal* of "rock and roll" to the celestial spheres of the waltz is not yielding to the social impact of a fashion but anticipating imminent social phenomena.

Two different instincts underlie fashion: imitation and class distinction. The woman who blindly adopts every fashion does so because, although fashion actually destroys individuality by making all people alike, it also bolsters those with a weak or no individuality by upholding them in the mass. In this sense fashions have the same effect as replacing the national costume that distinguishes one people from another by a common universal costume that makes all people look alike. In Turkey, Kemal Ataturk, desirous of "westernizing" his people, made them substitute Western headgear for the picturesque *chechias* of Anatolia. In the Roman Empire, from the Caucasus to Britain, the Latin attire was politically *de rigueur*. In the Madrid of Charles III, the people revolted when the government decreed that they cut down their huge cathedral-like sombreros and sweeping capes introduced a century earlier by the Flemish guards. In all these instances, fashion was used to usher in "on the twirl of a cape," in bull-ring parlance, a political concept.

Fashion "socializes" and differentiates at the same time, often originating as a reflection of the more powerful psychological impulses of an age. During the romantic period, bereaved women swathed themselves completely in solid black. With the austerity of mourning they artfully clothed their bodies, just as with their extreme pallor (caused by hypochromic anemia or chlorosis, the great "romantic malady") they veiled their smoldering romantic passions. Mourning attire was a sign of grief for the deceased, but it was also exploited for its mysticoerotic potentialities. The mysterious black wall of silk, which cloistered her as though in private communion with the departed husband, invested the attractive widow with a provocative charm. Often these bereaved ladies ended up, like Lehar's "Merry Widow," in places like Maxim's, dancing in the arms of some gallant swain to the dreamy strains of a waltz.

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* This is the full-length version of an editorial originally published in *MD* Medical Newsmagazine, September, 1958.

Clothing was born of three different imperative requirements: as a defense against the weather; as a sign of social rank; and as a sex stimulant. Today this last factor determines the changes in fashion. No sooner has one fashion exhausted its powers of suggestion upon the male than another one is contrived.

Fashions have been at times compensatory. Medieval pointed shoes and the farthingale fulfilled the respective functions of hiding unshapely feet and unwanted pregnancies. Women's clothes became more concealing in times of full-fleshed women, and tight-fitting in times when women's figures were, like the equator, an imaginary line. Medieval woman's social unimportance, typical of an epoch when man excluded woman from his life of hunting, feasting, and orgy, fostered a solemn hypertrophy in dress. By contrast, whenever woman has been dominant in a historical period, she has abbreviated her apparel to the minimum, which is what everybody does in a moment of crisis demanding direct attention—strip off and discard everything that might hinder action. In this light, nudism would be the maximum expression of a woman's personality, a woman who is not afraid to be what she is and wants to be nothing more.

Clothes therefore were not really born of the need to combat the weather. Some tribes discard their clothes when it rains. Clothes are a way of attracting attention, in imitation of those tropical birds whose brilliant plumage makes them more sought after by the opposite sex. Modern fashions indulge in the element of surprise. Hence the violent contrasts and the fact that fashion "comes from abroad," a distant country, Paris nearly always. This is what the natives of the Solomon Islands did when they imported "from the outside" the fashion of paying in oyster shells.

The woman bent on following all the fashions does so to break the established order, to attract attention, or as a rebellion against the male, who, poor thing, is always more conservative. But the female fashion plate is hardly ever an interesting woman. Fashion becomes the core of her personality, a hard and constant slavery. All day long she must pay service to elegance and must trot from place to place so that men and, even more important, other women may notice her. This usually turns her into a bored and boring creature.

On the other hand, there is the woman who can select from the vast common stock of possibilities. In that divine faculty of knowing which costume will enhance, not drown, her personality lies the secret of the interesting woman, the woman who can work her will on fashion, adopting only what will complete her personality and transform her into a true thing of beauty.

The important point to remember is that fashion is a revealing dimension and symptom of an epoch, which allows a precise prognosis of its historical course. The postwar bangs, switches, and hair pieces with which women concealed not only part of their faces but their thoughts were indicative of the state of mind that led to the social crises previous to World War II. Today's "sacks," "rock and roll," and "angry young men" are signs of an attitude that borders between contrition (sackcloth and ashes) and discontent (revolt against the pirouette), an attitude far more dangerous than the hydrogen bomb.

QUARTERLY REVIEW OF OPHTHALMOLOGY

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FOREWORD: A New Policy

The objective of the Quarterly Review of Ophthalmology is to bring together in one publication a concise record of current happenings, both national and international, in this field. Selection and editing of material are designed to prove informative to *the entire medical profession* as well as to ophthalmologists. Manuscripts for the Quarterly Review of Ophthalmology should be submitted to Dr. Arnold S. Breakey, Ophthalmological Foundation, 111 East 59th St., New York, N. Y.

ABSTRACTS

OPHTHALMOLOGY PER SE

24. *Needless Loss of Vision: Its Prevention.* FRANK W. LAW. Canad. M. A. J. *78*: 1–5, Jan. 1, 1958.

Blindness from ophthalmia neonatorum can be brought to a minimum by adequate prenatal and natal care and the use of sulfonamides and antibiotics. Retrolental fibroplasia may be limited by careful attention to the concentration of oxygen administered to the premature infant. The eugenic elimination of certain hereditary disease, such as retinitis pigmentosa and myopia, is of questionable value.

The relationship between congenital anomalies and maternal infection by rubella is undeniable. The question of termination of pregnancy in the face of rubella infection must be considered on occasion.

Attention should be paid at an early age to squint and amblyopia ex anopsia. There will be no spontaneous cure, and early treatment may prevent a needless loss of vision.

Glaucoma may occur in children as buphthalmia; in older persons, as chronic simple glaucoma. Both these conditions have few symptoms and may not be noticed. Congestive and acute glaucoma are usually accompanied by redness of the eye, pain, and subjective visual disturbances and, therefore, are readily apparent. The taking of visual fields, the appearance of the disc, and the use of the tonometer should be guideposts in the search for glaucoma.

Trauma is an important cause of loss of vision. Severe injuries to the eye should be treated with the greatest care; it is particularly important to examine closely for perforating injuries.

In no branch of medicine is the superiority of prevention over cure more obvious than in ophthalmology. 7 references.—*Clement McCulloch, M.D.*

25. *Standards for Licensing Drivers of Motor Vehicles.* DEREK G. SIMPSON. Tr. Canad. Ophth. Soc. *9*:148–167, 1957.

It is recommended that three levels for testing drivers of motor vehicles be established: Test stations should be set up at which simple tests conducted by personnel of the licensing authority can be done. The candidates who fail at the test stations should be advised to see an ophthalmologist. An appeal board should be established.

The ideal standards would be better than a level of defect that is proved to be a factor in the causation of accidents, uniform for the region in which the license is valid and stricter for drivers of heavy transport and public carriers.

Three sets of standards, for heavy transport, light transport, and private car drivers, are presented in tabular form. Standards for color vision and depth perception are included in the recommendations for British Columbia. Standards of refractive error are not included. 5 references. 4 tables.—*Clement McCulloch, M.D.*

26. *Psychological Reactions to Blindness in the Adult.* KENNETH A. HAMILTON. Tr. Canad. Ophth. Soc. *9*:204–211, 1957.

The reaction to blindness in an adult is similar to mourning. There is initially a state of shock, followed by a period of depression, which is equivalent to mourning. If pain is present it may be an expression of anxiety. At the time of the patient's mourning and anxiety there may be depression. This occurs when the newly blinded person begins to experience other emotions again; it is similar to a "reactive depression." The patient needs to go through this depression in order that he may accept reality and proceed with rehabilitation. Society attempts to prevent a newly blinded person from accepting his blindness. This is a mistake. He must be allowed to go through the period of depression before he can advance to a constructive phase of rehabilitation.—*Clement McCulloch, M.D.*

27. *A New Method of Electronic Tonography.* T. HAROLD HODGSON AND R. KEITH MACDONALD. Tr. Canad. Ophth. Soc. *9*:78–87, 1957.

Tonography was done by applying the Schiøtz tonometer to the sclera, to one side of the cornea. The tonographic measurements with the tonometer are done before and after application to the sclera. The aqueous flow figures are calculated from these two readings.

Scleral compression resulted in less lowering of pressure than did corneal compression. Cases of established glaucoma and of narrow-angled glaucoma not in an acute phase were diagnosed. Cases of moderate to severe loss with low tension also fell within the glaucomatous group on the sclera compression test. 7 references. 9 figures.—*Clement McCulloch, M.D.*

28. *Tonography in Clinical Practice.* J. E. L. BENDOR-SAMUEL AND HOWARD REED. Tr. Canad. Ophth. Soc. *9*:31–37, 1957.

Tonography is in general use in research centers and glaucoma clinics, but the authors consider that it can be profitably employed in clinical ophthalmology in the office. A lowered facility of outflow may be found in an eye with a narrow angle because of peripheral synechiae or because a simple type of glaucoma has occurred in an eye that happens also to have a narrow angle. A survey of cases in which tonography and a water-drinking test have both been carried out suggests that some cases of glaucoma would have been missed if the water-drinking test alone had been employed. Becker's concept of a ratio between the original intraocular pressure and the coefficient of facility of outflow is proving helpful in confirming a diagnosis of glaucoma. Some eyes with advanced cupping and field changes have a low intraocular pressure, and this is shown by tonography to be due to a lowered production of aqueous. 7 references. 1 table.—*Clement McCulloch, M.D.*

29. *Retinal Venous Thrombosis.* FRANK W. LAW. Tr. Canad. Ophth. Soc. *9*:38–50, 1957.

There may be a thickening of the wall of the central retinal vein before the actual

occlusion; however, the final closure is caused by a thrombosis. Slowing of the venous blood is a basic etiological factor, but roughening of the endothelium of the vessel may be of significance. The primary cause of the slowing of the venous blood stream may be on the arteriolar side of the vascular tree. In many victims of retinal venous thrombosis there is no general vascular disease.

There is evidence that a clot forms more slowly if anticoagulants are present and that recanalization of a thrombosed vein is more rapid if the prothrombin level is low. Since a good proportion of patients make an excellent recovery, it is hard to collect a controlled series that might prove the value of anticoagulants as a form of therapy.

Fifty unselected cases from private practice were studied. Two were bilateral. The sexes were equally represented. The age range was from 45 to 83 years, with an average of 62½ years. Twenty-five of the original patients were separated for further study. Of these, 18 showed central venous blocks and 8, tributary blocks. Eighteen were of the superior temporal vein and 4 of the inferior temporal vein. There was no occlusion of the nasal vein. In half the cases there was significant vascular hypertension. Of the 8 patients with tributary thrombosis, 1 became blind from secondary glaucoma; 1 gained count of fingers only; 2, 6/24; 2, 6/9; and 2, 6/5. Of the 18 patients with central venous thrombosis, 5 suffered a secondary glaucoma and gained hand movements only; 3, count of fingers only; 2, 20/60; 3, 6/18; 5, 6/6.

No treatment was attempted in the established cases. Heparin and bishydroxy coumarin were given in cases of threatened or partial thrombosis. 4 references. 3 figures. 2 tables.—*Clement McCulloch, M.D.*

30. *Sympathetic Ophthalmia Treated with Steroid Therapy.* JAMES F. MINNES. Tr. Canad. Ophth. Soc. *9*:88–96, 1957.

The course of 6 cases of sympathetic ophthalmia is described.

The use of steroid drugs provides a better visual prognosis than other modes of therapy. The prophylactic use of such drugs may mask the inflammatory signs of sympathetic ophthalmia without preventing its development.

There has been a diminishing number of cases of sympathetic ophthalmia in recent years. This can be attributed to refinements in surgical technique, which prevent postoperative complications, to the greater care and the repair of wounds, to close scrutiny of injured eyes during the danger period, and to early enucleation. Nystagmus may retard wound healing after an operation and lead to sympathetic ophthalmia.

Mild cases treated vigorously, shortly after their onset, have the best prognosis. Treatment of choice appears to be ACTH, given intravenously, followed by oral prednisone to prevent relapse. 7 references. 4 tables.—*Clement McCulloch, M.D.*

OPHTHALMIC PATHOLOGY

31. *Diktyoma (Medullo-epithelioma): A Case Report.* K. O. FLEMING. Tr. Canad. Ophth. Soc. *9*:122–128, 1957.

A 4 year old boy had a red, irritable, sensitive eye for four months. Corneal pre-

cipitates were present and there were numerous cells in the anterior chamber. The fundus was not visible; the ocular tension was not elevated but the sight was lost. On sectioning, the eye bands and sheets of tumor were found extending over the posterior surface of the iris, along the anterior face of the vitreous, onto the anterior surface of the lens, and posteriorly along the pars plana.

Four and a half years later the boy was in excellent health; no metastases have occurred, and there has been no local recurrence. 6 references. 4 figures.—*Clement McCulloch, M.D.*

32. *Disseminated Pigmentary Deposits in Melanoblastoma of the Choroid.* A. HAGEDOORN AND I. SALIM. Am. J. Ophth. *45*:51–59, Jan., 1958.

In 1931 Zeeman described *taches noirâtres*, dark gray pigmentations at a considerable distance from a melanoblastoma of the choroid in an apparently normal area of the retina. In 1949 Samuels drew attention to a slitlike detachment occurring in melanoblastoma.

The author describes the proliferation and desquamation of cells of the pigment epithelium, mainly over the tumor. According to Samuels, there is production of an albuminous fluid at the site of the tumor, which spreads along a slitlike detachment over the fundus and also toward the ora serrata.

It is suggested that desquamated pigment cells spread all over the fundus together with the stream of the albuminous fluid. The resorption of this fluid in certain areas of the fundus causes the deposits to be seen in an apparently normal area. There are 18 illustrations of the clinical aspect and the pathology of the condition. 4 references. 18 figures.—*Author's abstract.*

33. *Primary Tumors of the Iris.* JAMES R. DUKE, Baltimore, Md. A.M.A. Arch. Ophth. *59*:204–214, Feb., 1958.

Forty-three primary tumors of the iris examined at the Wilmer Institute between 1925 and 1956 are reported.

Thirteen of these tumors were benign melanomas. One tumor was a leiomyoma, and there was 1 tumor of uncertain histogenesis, characterized histopathologically by the presence of spindle cells and large, bizarre, multinucleated giant cells.

The remaining 28 tumors were malignant melanomas of the iris. All of these occurred in Caucasians. There was a higher incidence in women, and the average age of the patients was 42 years. The visual acuity was good unless glaucoma had developed, a complication that occurred in one third of the cases. Microscopically, the majority of these tumors were spindle-cell in type. They tended to be located near the root of the iris, and invasion of the ciliary body was common. Extension or deposition of tumor cells in the chamber angle was also a frequent finding. Treatment varied between enucleation as a primary procedure (18 cases) and iridectomy alone (6 cases). In 4 other cases, enucleation was performed after a preliminary iridectomy had disclosed a malignant melanoma. In 21 cases followed five years or longer there was evidence of recurrence of the tumor in 1 case, this patient dying of widespread melanomatosis. Some possible factors contributing to this low mortality

rate of 4.8 per cent are mentioned. 15 references. 12 figures. 1 table.—*Author's abstract.*

OPHTHALMOLOGY IN MEDICINE

34. *Lipaemia Retinalis: A Case Report and a Review of the Literature.* H. WYATT LAWS AND ELEANOR R. HARPUR. Tr. Canad. Ophth. Soc. *9*:97–107, 1957.

Lipemia retinalis was seen in a 28 month old diabetic child. On the day of the first observation the total plasma lipids were 16.0 Gm./100 ml. There was profound acidosis, low serum potassium, hyperglycemia, and extreme anemia. Treatment consisted of administration of insulin, sodium, and potassium. Intravenous injections of plasma and whole blood were given. By the third day the total plasma lipids were 11.7 Gm./100 ml., and lipemia retinalis was clearing. By the seventh day the fundus was normal in appearance; the blood lipids were approximately 4.0 to 3.0 Gm./100 ml.

The degree of lipemia does not parallel the degree of acidosis. Similarly, there is not a direct correlation between the appearance of the fundus and the content of lipid in the blood. An increase in neutral fat is the only lipid change consistently associated with lactescence. The chylomicra of lactescence are 7 to 20 microns in diameter. In the retinal vessels the chylomicra tend to congregate along the walls of the vessel, the red blood cells collecting in the middle of the lumen. The flow is faster in the center, the red blood vessels passing rapidly through the artery at that location, the chylomicra rolling more slowly along the walls. This margination of the chylomicra gives the appearance of lactescence. If anemia is present, the dilution of red cells will nullify any red coloration and increase the milky appearance of the vessels. 62 references.—*Clement McCulloch, M.D.*

35. *Electromyography—A Tool in Ocular and Neurologic Diagnosis. III. Supranuclear Mechanisms.* GOODWIN M. BREININ, New York, N. Y. A.M.A. Arch. Ophth. *59*:177–187, Feb., 1958.

Electromyography of the extraocular muscles in a series of supranuclear disturbances has revealed a number of patterns that may be significant in establishing a topical diagnosis. Many conjugate deviations exhibit a spindle pattern of firing as well as saccadic movements.

Of special interest are cases of internuclear palsy (medial longitudinal fasciculus syndrome). The apparently paretic medial rectus exhibits no electrical evidences of paresis. It increases firing up to a certain point but not further. Its antagonist decreases activity reciprocally down to zero without any increase in adduction beyond the mid-line. The lateral rectus in its field exhibits a spindle pattern in many cases. In some, a jerky type of nystagmus occurs.

The jaw-winking syndrome reveals large activity of the levator on jaw movement exceeding the amount developed in voluntary elevation of the lid.

Data derived from a variety of lesions suggest that paretic squint requires not only loss of activity of the agonist but an increase of activity of the antagonist. In the

absence of such increase in the antagonist the globe does not assume a strabismic position. 5 references. 15 figures.—*Author's abstract.*

36. *A Contribution to the Diagnosis of Arteriosclerosis and Hypertension.* ROBERT SALUS, Milan, Italy. Am. J. Ophth. *45*:81–92, Jan., 1958.

The pathological changes at the crossings of retinal vessels, which occur in the form of the arching sign (Gunn's sign) in long-standing hypertension or in the form of the nicking sign (Salus' sign) mainly in arteriosclerosis or as the early stage of the arching sign, are regarded as absolutely reliable diagnostic points. Caliber changes of the arteries, Gunn's silver wire arteries, and the fovea hypertonica also appear to be pathognomonic but occur less regularly. 9 references. 11 figures.—*Author's abstract.*

OPTICS IN OPHTHALMOLOGY

37. *Binocular Corrections for Low Vision.* GERALD FONDA, Short Hills, N. J. Am. J. Ophth. *45*:23–27, Jan., 1958.

Binocular vision for reading can be experienced with binocular additions as strong as +10.0 diopters. Advantages of binocular correction for low vision are: larger field of vision, greater depth of focus, and psychological desirability because the patient prefers to use both eyes. Types of binocular reading correction are regular lenses, half eyeglasses, and bifocals. The rule of thumb for decentration states that the reading lenses or bifocal segments must each be decentered in 1 mm. for each diopter of reading addition.

Sixty-five prism diopters of convergence are required to read at 10 cm. by a patient with a distant interpupillary distance of 65 mm. Consequently, it is impossible to create too much base-in prism in the reading correction for the patient unless he shows a considerable convergence excess. The range of low vision corrected by strong binocular reading additions is from 8/200 to 20/40. The range of vision suitable for binocular correction depends on the age of the patient, type of ocular pathological change, and visual requirement. 3 references. 4 figures.—*Author's abstract.*

OPHTHALMOLOGY ABROAD

38. *Investigation into the Control of Trachoma in Sekhukuniland.* JOHN A. PRATT-JOHNSON AND JURIE H. W. WESSELS. South African M. J. 32:212–215, Feb. 22, 1958.

Sekhukuniland is a native reserve in northeastern Transvaal. Previous investigations have found the incidence of trachoma among certain tribes (Bapedi) to be well over 90 per cent. The authors made a systematic examination in different parts of the country. In the Sekhukuniland flats, in more than 2000 patients examined, the incidence of trachoma was 100 per cent. Of these, 44 per cent were active cases. In the Lulu Mountains 97 persons were examined and not a single case of trachoma could be found. In the border area between the flats and the mountains (Magolego),

among 50 adults, the incidence of trachoma was again 100 per cent, but of these only 6 per cent were active cases.

The authors find the explanation of these striking differences in two factors: the amount of flies and the amount of water. In the flats, flies are numerous and water is scarce. In the mountains, the opposite is the case. In the border areas, both flies and water are plentiful, which seems to make for as high an infection rate as in the flats, but far less activity of the virus. The authors found no evidence to support the theory that malnutrition plays a major part in the etiology and spread of trachoma. Measures for the control of trachoma should include the provision of adequate water supplies and the control of flies. Treatment with sulfonamides given parenterally and antibiotic ointment used locally arrests active trachoma and rapidly clears all evidence of the commonly associated secondary infection. However, reinfection readily occurs. Many children had to be treated in this way four times during one summer. Emphasis should therefore be laid on preventive measures. It seems fruitless to attempt to combat trachoma by drug therapy alone.—*A. Jokl.*

BOOK REVIEWS

The Glaucomas. H. SAUL SUGAR, M.D. Ed. 2. New York, Paul B. Hoeber, Inc., 1957. Pp. 516, with 164 illustrations. Price $13.50.

The second edition of this respected text on glaucoma is well illustrated and accompanied by schematic drawings devised by the author. The abundance of important details in the description of difficult procedures such as provocative tests, as well as of therapy, is especially welcome inasmuch as further reference for specific dosage, etc., is unnecessary.

Dr. Sugar's exhaustive bibliographical references following each chapter augment the value of this book to research workers in the basic as well as clinical aspects of this disease. In general, this book more than ever deserves its place on the active bookshelf of all practicing ophthalmologists.—*Mortimer R. Cholst, M.D.*

The Vertebrate Visual System. STEPHEN POLYAK, M.D. Edited by HEINRICH KLÜVER, Chicago, University of Chicago Press, 1957. Pp. 1390. Price $45.00.

This remarkable book concerning the visual system of vertebrates includes the origin, structure, and function as well as a study of the diseases that affect the system and an analysis of the importance of this system in the origin of man and the life of animals. The book is beautifully printed with double columns on large pages with wide margins and includes 1000 pages of text, beginning with an excellent historical review of investigations of the structure and function of the eye and the visual pathways and centers of the brain.

The bibliography is unusually extensive and covers 300 pages; it should make the task of scientists and physicians interested in this field much lighter in gathering material for research. The great majority of the bibliographical references had been examined personally by Dr. Polyak before his untimely death in 1955.

Scientists and physicians interested in the visual sciences owe a great debt of gratitude to Heinrich Klüver for having completed this monumental work after the death

of Dr. Polyak because they will find not only important fundamental scientific data, treated with great clarity, but also much material of importance in the clinical diagnosis of visual difficulties, scientifically treated.

The 30 pages of index add greatly to the value of the volume. Many excellent illustrations and photographs with long descriptive titles sustain interest in reading the text and clarify many points that might otherwise be difficult to understand.

The publication of this outstanding work was made possible by grants from the Dr. Wallace C. and Clara A. Abbott Memorial Fund of the University of Chicago, the John Simon Guggenheim Memorial Foundation, the United States Public Health Service, and the National Science Foundation. The University of Chicago Press has done excellent work in printing this book, which should be in all libraries. The book is recommended as essential reading for all those interested in the eye and visual sciences.—*Conrad Berens, M.D.*

Strabismus Ophthalmic Symposium II. Edited by JAMES H. ALLEN, M.D. St. Louis, C. V. Mosby Co., 1958. Pp. 541, with 251 illustrations. Price $16.00.

This book reports the second symposium on strabismus sponsored by the New Orleans Academy of Ophthalmology. The panel consisted of the following authorities in the field: F. H. Adler, H. W. Brown, H. M. Burian, F. D. Costenbader, W. H. Fink, G. P. Guibor, P. Knapp, and K. C. Swan. The viewpoints of the authors are represented in 22 chapters and a round-table discussion covering the subject thoroughly from anatomy and physiology to medical and surgical treatment. As would be expected, there are differences of opinion in some basic concepts, and several theories expressed are not accepted generally. This is especially true of Guibor's method of treating strabismus by the use of prisms. There are many other authorities who disagree with the panel's opinions favoring surgical correction by the binocular simultaneous symmetrical approach except for "monocular squints."

There are 40 pages of round-table discussion, which are interesting and informative. This book is highly recommended for every ophthalmologist as a means of reviewing recent trends in the field of strabismus. The resident in training in ophthalmology would benefit from this text after he has mastered the basic concepts of the subject. The book has no value for the general practitioner, but it will be a welcome addition to libraries housing ophthalmological texts.—*J. H. King, Jr., M.D.*

Principles of Ophthalmoscopy. JOHN K. ERBAUGH, M.D. Springfield, Ill., Charles C Thomas, 1957. Pp. 64. Price $5.50.

In a clearly written book of 64 pages Dr. Erbaugh has succeeded in presenting not only the principles of ophthalmoscopy, but most of the essential material needed by internists, general practitioners, and neurologists when using the ophthalmoscope in making a diagnosis. Many drawings and several excellent color plates add immensely to the value of this work in clarifying descriptive material.

In an appendix, the author has covered briefly, but well, the principles of the use of the ophthalmoscope. This should be read by any man who wishes to study ophthalmoscopy.

There is an excellent table of contents, which points out the logical arrangement of the material. The author starts with a description of the normal disc and its margins, then discusses the common pathological condition detected on the disc: optic atrophy, papillitis, and papilledema. Affections of the vessels, the retina, and the macula are briefly treated in other chapters. His descriptions of the retinopathies secondary to functional vascular disease and those associated with organic vascular disease give an unusually clear, but not too detailed, description of the findings in these conditions.

There is a brief index relating to anatomical structures and one relating to pathologies, which adds to the value of this small book for reference purposes.

This book is clearly printed and attractively presented. It is enthusiastically recommended to anyone who desires to read a brief, informative outline of the essentials of ophthalmoscopy.—*Conrad Berens, M.D.*

Traquair's Clinical Perimetry. Revised by G. I. SCOTT. Ed. 7. St. Louis, C. V. Mosby Co., 1957. Pp. 333, with 280 illustrations.

This edition, like its predecessors, emphasizes the significance of perimetry as a diagnostic method of examination. This branch of ophthalmology has gone far beyond the stage of generalizations and working hypotheses. Facts have been accumulated, organized, and integrated into specific knowledge essential not only to ophthalmology but also to neurology. It is also pointed out that perimetry is a clinical rather than a technical laboratory method for the detection not only of ocular conditions but also of intracranial conditions. It serves moreover for the exclusion of these conditions, for in many cases proof of the absence of a lesion is just as important as proof of its presence.

In addition to emphasizing basic principles, this edition strongly recommends a meticulously performed confrontation test as part of every ophthalmological examination. It describes in detail the applied anatomy of the various parts of the visual pathway because only by familiarization with the normal can a better understanding be acquired of the pathological conditions of the visual pathway and a more accurate interpretation be made of the corresponding changes in the visual fields.

Various types of equipment of value in perimetry are presented. In addition to the conventional standard apparatus, such as the tangent screen and the perimeter, the projection type of apparatus is also described.

A number of illustrations and certain parts of the text are clarified and some new data are introduced in the appendix.

The beginner in perimetry may be awed by the textual matter contained in this book, but the more advanced student will find it meaningful and the experimental practitioner will be delighted with its completeness.

Although this revised edition does not differ greatly from the last edition by the original author, ophthalmology and neurology owe a debt of gratitude to Dr. Scott, the reviser, for helping to perpetuate Dr. Traquair's fine contribution to the science and art of medicine.—*Joshua Zuckerman, M.D.*

Physiology of the Ocular Vascular System

LACK OF RESEARCH IN OCULAR VASCULAR PHYSIOLOGY. A knowledge of ocular vascular physiology is of fundamental importance for a complete understanding of the function of the eye in both health and disease. While this fact is well appreciated, investigation of ocular vascular physiology has been extremely limited. The main reason for this lack of research is no doubt the relative inaccessibility and small volume of the vasculature of the eyeball.

OCULAR VASCULAR SYSTEM IS A HIGH PRESSURE SYSTEM. The vascular pressures have been determined by two techniques--the direct method of cannulation and the indirect method of balancing the blood pressure with an external pressure. While the alterations associated with the trauma of cannulation limit the usefulness of the direct technique, it has been established that the ocular vascular system is a high pressure system analogous to that of the kidney. The indirect technique has recently found increasing clinical application in the measurement of retinal arterial pressure for the diagnosis of carotid thrombosis. This test is useful empirically; however, the pressure determined by this method is not the original pressure in the retinal artery. As the retinal vessel is compressed, its pressure increases to that of the ophthalmic artery, where the former vessel arises. The presence of optic papillary vessels that branch off in part to areas not under the influence of the intraocular pressure has recently been emphasized. It has been suggested that this anatomical configuration minimizes the compensatory pressure increase mechanism against an elevated intraocular tension. This may be an important factor in the pathogenesis of glaucomatous field loss.

DETERMINATION OF OCULAR BLOOD VOLUME. New techniques for the determination of ocular blood volume include direct visualization of the choroidal vasculature through the dehydrated transparent sclera or a scleral window and measurement of radioactivity of labeled red cells in the

choroid. A new method for determining organ blood flow has been applied to the eye. It is based on the parallel fractionation of an injected tracer with the fractionation of the cardiac output by the organs of the body. Older methods for blood flow analysis include measurement of temperature changes with thermocouples, alteration in the electroretinograms and flicker fusion frequency, and ascorbic acid clearance by the ciliary body. In general, the validity and accuracy of these techniques have not been established with certainty. Information on the occurrence and extent of ocular blood volume changes during tonography would be most helpful in the interpretation of this test.

FACTORS THAT CONTROL OCULAR CIRCULATION. Little is known about the factors that control the ocular circulation. The evidence to date indicates minimal neurogenic control under normal conditions, although diencephalic stimulation can produce isolated changes of intraocular pressure, independent of systemic blood pressure alterations. The eye exhibits, in a well-defined manner, the axon reflex with vascular dilatation. Marked dilatation after carbon dioxide administration has recently been demonstrated with the radioactive technique for ocular blood volume. The release of histamine or a histamine-like substance is thought to be the common denominator of the inflammatory vascular dilatation after many diverse ocular insults such as trauma, toxins, and anaphylaxis. As the active agent has not been identified with certainty, a further study of amine release in ocular tissues should prove valuable.

Ralph Z. Levene, M.D.
New York, N. Y.

Clearing Center for Eye Banks

Rochester has been designated as the location for a clearing center for the collection and distribution of eyes needed by physicians for transplant surgery. The recently formed Associated Eye Banks will serve to link 13 eye banks in New England, New York, New Jersey, and Pennsylvania. The clearing center will enable eye surgeons to obtain the material they need from one source instead of contacting separate eye banks in various cities.

Questions and Answers

Q. *A patient of mine has been treated for glaucoma for many years. He has been using pilocarpine and acetazolamide. His tension is supposed to be normal. Would this indicate that the condition is stationary?*

A. The evaluation of the condition of a glaucomatous eye requires more data than you have furnished. Although by definition elevation of intraocular pressure indicates the presence of glaucoma, other factors are equally important. Vision and visual fields are two factors most frequently mentioned. However, in most cases of open-angle glaucoma (and this, I presume, is the condition you describe), the facility of outflow of the intraocular fluid through the drainage system of the eye becomes progressively impaired. As long as acetazolamide suppresses the production of the intraocular fluid, the intraocular pressure may remain normal. If the drainage system continues to fail, a state will be reached when the available drainage channels will be inadequate to carry away the amount of fluid produced. Therefore, periodic checking of the facility of outflow is of utmost importance in determining the condition of such a glaucomatous eye.

Q. *A 3 year old boy has been developing gradually increasing wryneck. He was referred to an orthopedic surgeon, who considered surgery on the sternocleidomastoid muscle, but suggested an eye examination. Can wryneck be treated with glasses?*

A. A certain percentage of cases of torticollis are of ocular origin. More accurately, they result from ocular muscle imbalance, which leads to diplopia. In order to obtain single binocular vision (fusion), the child compensates for the inadequate action of a muscle by tilting the head. Thus the images of the two eyes are properly aligned and fusion is achieved. Slight degrees of such a muscle imbalance may be corrected with glasses containing prisms. In more pronounced imbalance, surgery on eye muscles is usually necessary.

Q. *How important is prolonged immobility after surgery for retinal detachment?*

A. This depends primarily on the surgical procedure employed for the repair of the retinal detachment. Most advocates of the "buckling" procedure maintain that the patient should not be confined to bed for more than a few days. Adherents of the electrodiathermy procedure without scleral resection or folding are divided in opinion. They recommend bed rest for from less than one week to more than two weeks.

It would thus appear that there is no definitely established rule for postoperative immobilization of these patients. Moreover, many ophthalmologists call attention to the difference between immobilization of the head (and body) and that of the eyes. Unless the patient is heavily sedated, his eyes are in continuous fine subconscious movement in addition to the more extensive movements of which the patient

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NOTE: Questions from our readers are invited. Address George Z. Carter, M.D., Ophthalmological Foundation, 111 East 59th St., New York, N. Y.

is aware. For these reasons, some surgeons bandage both eyes, while others leave the eyes uncovered after one or two days.

In general, there is a growing tendency toward relative freedom from immobilization in the postoperative care of retinal detachment.

Q. *What is the significance of seeing "flashing lights"?*

A. The explanations for this phenomenon are manifold. Dancing lights may be due to afterimages following gazing at bright objects. They may be caused by blood cells passing through the capillary network in the macular area of the retina. "Moore's lightning Streaks" are the manifestation of vitreous shrinkage. However, "lightning flashes" may indicate formation of retinal tears or holes with the potential danger of retinal separation.

The diagnosis can be suspected if the patient can furnish an accurate description of the disturbance, but the complaint should not be taken lightly, and a thorough examination of the inner eye with dilated pupil is mandatory.

Q. *Why does watching television cause eye fatigue?*

A. In principle, the reasons are similar to those in regard to motion pictures. The idea, maintained by some patients, that the fluorescent tubes emanate dangerous radiation has not been substantiated. Neither infrared nor ultraviolet rays are emitted by the television screen. The level of illumination can be easily adjusted.

Uncorrected refractive error and muscular imbalance may become more noticeable after concentration on the screen for prolonged periods. However, the main difference between motion pictures and television consists in the distance from which the screen is viewed. It is far removed in a movie theater, while television sets are usually viewed from only two to three yards (if not less). This increases the accommodative effort and may explain why persons who are quite comfortable in the movies complain of eye fatigue when viewing television.

Q. *The mother of a 2 year old boy noticed that the left eye seems to be much closer to the inner corner than the fellow eye. The child was examined by an ophthalmologist, who said that the eyes were straight. How can this be explained?*

A. Although an accurate reply to your question is difficult without examining the boy, it would seem that the child has an epicanthus, probably more marked on the left side. Epicanthus is a congenital deformity characterized by a vertical fold of skin on either side of the bridge of the nose. These folds are curved with concavity directed away from the mid-line. The fold frequently covers the inner part of the lids, and if it is more marked on one side, it may give the appearance of convergent squint.

A moderate degree of epicanthus is observed occasionally in very young children; it is caused by the lack of development of the nasal bones and disappears as the child grows older. If the deformity persists, it can be corrected surgically.

George Z. Carter, M.D.
New York, N. Y.

CASE REPORT

Keratoconjunctivitis Caused by Molluscum Contagiosum

The patient, a 45 year old white woman, had recurrent episodes of conjunctivitis involving the right eye for a period of approximately eight months. On each occasion the conjunctivitis had been improved, but not cured, by the use of antibiotics. Cultures had repeatedly produced a non-hemolytic *Staphylococcus*, coagulase-negative. The patient, however, showed a high cutaneous sensitivity to *Staphylococcus* toxoid. Consequently, courses of desensitization with both autogenous vaccines and commercial *Staphylococcus* toxoid were instituted. On several occasions a polymorphonuclear response was noted in the conjunctival scraping. Clinically the best therapeutic results were achieved with the use of steroids topically. Unfortunately, each time the steroids were discontinued the conjunctival inflammation returned. On several occasions the patient complained of foreign body sensation and slight photophobia. At such times there appeared to be superficial staining of the cornea. This appeared as minute abrasions of irregular and varying size and shape over the entire cornea.

The last examination showed a follicular conjunctivitis without preauricular adenopathy. There was staining of the cornea, as described, and there appeared to be an early superficial pannus invading the upper one fifth of the cornea. Of particular interest were two small, pearly umbilicated nodules situated at the base of the lashes and extending onto the margin of the upper lid. Excision and biopsy of these tumors revealed the typical cytology of molluscum contagiosum. The conjunctivitis has not recurred since the removal of this nodule.

Molluscum contagiosum is a cutaneous disease that spreads by personal contact or by fomites. The appearance of these virus nodules on the lid margins may cause a severe follicular and, rarely, papillary conjunctivitis. The corneal lesions and those of the conjunctiva are thought to be toxic in origin since scrapings of these regions do not reveal the virus, although excision of the lid tumor results in alleviation of signs and symptoms. Positive diagnosis is made by curettage or biopsy with identification of the typical molluscum bodies. The virus has not been passed on to animals nor has it been grown in tissue cultures. Infection does not induce immunity nor does the virus institute changes that can be detected serologically.

Dahar Cury, M.D.
Huntington Park, Calif.

EDITOR'S NOTE: This section is devoted to case histories of typical daily problems in the eye field. It is designed to help the reader toward a better understanding of diagnoses and treatment in ophthalmology.

health and travel

Complete proceedings of the First Symposium on Health and Travel, held in June of 1955. Travel for the young, the old, the sick; by car, air, train, boat, and space ship; in the continental U. S., Europe, Latin America, Asia; in tropical and subtropical climes. All these problems are covered in their physiologic and psychologic aspects by top specialists in their field. The monograph includes detailed information on prophylaxis and treatment, as well as historical and entertaining general data. This attractive hard-cover book is a classic reference book for your library, as well as an attractive and much appreciated gift for a fellow physician. 72 pp. **Price: $3.00.**

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